

QUINNIPIAC RIVER BASIN
TOWN OF WOLCOTT

BRISTOL FISH AND GAME CLUB DAM
CT-00299

NATIONAL DAM INSPECTION PROGRAM
CORPS OF ENGINEERS

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HAZARD

PHASE I INSPECTION REPORT

NATIONAL PROGRAM OF INSPECTION OF DAMS

Name of Dam:	BRISTOL FISH AND GAME CLUB DAM
Inventory Number:	CT 00299
State:	CONNECTICUT
County:	NEW HAVEN
Town:	WOLCOTT
Stream:	CUSSGUTTER
Owner:	BRISTOL FISH AND GAME CLUB
Date of Inspection:	APRIL 29, 1981
Inspection Team:	PETER M. HEYNEN, P.E.
	MURALI ATLURU, P.E.
	JAY A. COSTELLO

Bristol Fish and Game Club Dam is located on Cussgutter Brook (Quinnipiac River Basin) in a rural area in the Town of Wolcott, County of New Haven, State of Connecticut. The dam is shown on the Bristol USGS Quandrangle Map, having coordinates latitude N41°37.5' and longitude W72 56.0'. The drainage area is approximately 0.2 square miles and the maximum impoundment to the top of the dam is 130 acre-feet. Elevations given below are not NGVD, but correspond to elevations given on existing plans.

As shown on Sheet B-1, the dam is an earth embankment founded on bedrock and measuring approximately 600 feet long, 22.5 feet high (26.5 structural height), and 12 feet wide at the top. The elevation at the top of the dam is 738.5, which is 4.5 feet above the principal spillway crest. A 5 foot wide by 16 foot high bentonite clay core extends for the length of the dam. This core is placed on the bedrock foundation (elevation 712.0) and rises to elevation 728.0 along the upstream side of the cutoff trench. The upstream slope of the dam is inclined at 3 horizontal to 1 vertical and the downstream slope is inclined at 2 horizontal to 1 vertical. The slopes and top of the embankment have a grass cover, with some riprap along the waterline.

The principal spillway is a concrete drop inlet located on the upstream slope approximately 225 feet from the left end of the dam. This inlet consists of a 4 foot by 1.5 foot (I.D.) concrete riser and a 16 inch reinforced concrete outlet pipe, extending from the riser to the toe of the embankment. The riser has a crest elevation of 734.0, a bottom elevation of 720.3 and the pipe outlets at invert elevation 716.8. There are two vertical 4 foot by 1 foot openings at the top of the riser structure, which allow water to flow into the chamber and out the 16 inch RCP. The low-level outlet, also part of this spillway structure, consists of a 15 inch ACCMP which

extends for 30 feet from the riser chamber to the toe of the upstream slope, at invert elevation 121.0. A 14 inch low-level intake valve is located just upstream of the concrete riser and can be operated with the stem which extends to the riser hood, along the upstream side of the riser chamber.

The emergency spillway is a grass lined channel extending around the right end of the dam. The channel measures approximately 20 feet wide, with side slopes of 3 horizontal to 1 vertical and a crest elevation of 735.0. A small earth dike, measuring about 3 feet high by 80 long, extends along the left side of the spillway.

Based upon the visual inspection performed April 29, 1981, the project is assessed as being in good condition. The following features which could influence the future condition and/or stability of the dam were identified.

1. If the seepage at the toe of the dam is coming through the embankment, it could begin to carry material from the interior of the dam, creating a piping situation and thereby threatening the safety of the structure.
2. The lack of proper riprap protection on the upstream slope will lead to further sloughing and erosion of this slope, which may provide an area for overtopping during flood conditions.
3. Spalling of the concrete at the upstream and downstream sides of the riser hood at the drop inlet openings (Photo 3), could lead to failure of the hood or riser structure, possibly blocking the spillway during periods of high flows.
4. Animal burrows can provide seepage paths through the impervious core, which can promote piping and possibly lead to failure of the dam.

It is recommended that the owner retain a registered professional engineer qualified in dam design and inspection to perform services pertaining to the following items. The engineer should establish recommended corrective procedures which should then be promptly implemented by the owner.

1. Monitoring and evaluation of seepage at the toe of the embankment to determine its origin, affect on the safety of the structure, and any necessary corrective action.

2. Regrading of the upstream slope and placement of sufficient riprap to protect against erosion and sloughing of this slope by wave action. This riprap should be placed between expected high and low water elevations, and should extend around the right end of the embankment to protect against erosion should the emergency spillway be activated.
3. Repairing spalled concrete at the sides of the riser structure hood, along the waterline where water enters the drop inlet.
4. Removing trees to a distance of 10 feet from the toe of the dam with proper backfilling and replacement of protective cover.
5. Elimination of burrowing animals in the embankment, backfilling the burrows and replacement of protective cover.

Also, the owner should initiate a formal program of operation and maintenance procedures, including a monthly inspection by the owner or owner representative and proper documentation to provide accurate records for future reference. A comprehensive program of inspection by a registered professional engineer qualified in dam design and inspection should be instituted on a biennial basis.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00299	2. GOVT ACCESSION NO. ADP 144201	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Bristol Fish and Game Club Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE April 1981
		13. NUMBER OF PAGES 45
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18. SUPPLEMENTARY NOTES Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Quinnipiac River Basin Town of Wolcott		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Bristol Fish and Game Club Dam is located on Cussgutter Brook in a rural area. The dam is an earth embankment founded on bedrock and measuring approximately 600 feet long, 22.5 ft. high and 12 feet wide at the top. Based on the visual inspection the project is assessed as being in good condition.		



OVERVIEW PHOTO
(April, 1981)

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	Bristol Fish & Game Club Dam	Wolcott	DATE June 1981
CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER		Cussgutter Brook	CONNECTICUT	CE # 27785KH
				PAGE ix

VISUAL INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Bristol Fish & Game Club Dam DATE: April 29, 1981

TIME: 12:30 P.M. - 2:30 P.M.

WEATHER: Cloudy, 70°F

W.S. ELEV. 734.2 U.S. N/A D.N.S

PARTY:

INITIALS:

DISCIPLINE:

1. <u>Peter M. Heynen</u>	<u>PMH</u>	<u>Cohn-Geotechnical</u>
2. <u>Murali Atluru</u>	<u>MA</u>	<u>DTC - H/H</u>
3. <u>Jay A. Castello</u>	<u>JAC</u>	<u>Cohn-Geotechnical</u>
4. _____	_____	_____
5. _____	_____	_____
6. _____	_____	_____

PROJECT FEATURE

INSPECTED BY

REMARKS

1. <u>Embankment</u>	<u>PMH, JAC, MA</u>	<u>A-2</u>
2. <u>Principal Spillway (Drop Inlet)</u>	<u>PMH, JAC, MA</u>	<u>A-3</u>
3. <u>Auxiliary Spillway</u>	<u>PMH, JAC, MA</u>	<u>A-4</u>
4. <u>Outlet Structure and Channel</u>	<u>PMH, JAC, MA</u>	<u>A-5</u>
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
9. _____	_____	_____
10. _____	_____	_____
11. _____	_____	_____
12. _____	_____	_____

PERIODIC INSPECTION CHECK LIST

Page A-2

PROJECT Bristol Fish & Game Club DamDATE April 29 1981PROJECT FEATURE Earth EmbankmentBY PMH, JAC, MA

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	
Crest Elevation	738.5
Current Pool Elevation	734.2
Maximum Impoundment to Date	Unknown
Surface Cracks	None Observed - Two animal burrows on d/s slope
Pavement Condition	N/A
Movement or Settlement of Crest	None Observed
Lateral Movement	
Vertical Alignment	Appears Good
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	Good
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	4/s slope at riser structure
Sloughing or Erosion of Slopes or Abutments	Sloughing along waterline and 4/s slope at riser structure
Rock Slope Protection-Riprap Failures	Insufficient riprap at waterline
Unusual Movement or Cracking at or Near Toes	None Observed
Unusual Embankment or Downstream Seepage	Seepage less than 5 gpm, 20' left of outlet and 25' d/s of outlet
Piping or Boils	
Foundation Drainage Features	None Observed
Toe Drains	
Instrumentation System	

PERIODIC INSPECTION CHECK LIST

Page A-3

PROJECT Bristol Fish & Game Club Dam

DATE April 29, 1981

PROJECT FEATURE Drop Inlet Riser Structure

BY PMH, JAC, MA

AREA EVALUATED	CONDITION
<u>OUTLET WORKS-CONTROL TOWER</u>	Concrete riser structure, crest elevation = 734.0
a) <u>Concrete and Structural</u>	
General Condition	Fair
Condition of Joints	Good
Spalling	At each end near waterline - aggregate visible
Visible Reinforcing	None Observed
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	Appears Good
Unusual Seepage or Leaks in Gate Chamber	Not observed
Cracks	None observed
Rusting or Corrosion of Steel	Rusting of trash rack bar
b) <u>Mechanical and Electrical</u>	
Air Vents	N/A
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	30 foot long, 15 inch ACCMP intake with 14 inch valve enters u/s side of riser chamber at the base. Outlets by 16 inch RCP at d/s side of riser chamber.
Service Gates	
Emergency Gates	
Lightning Protection System	N/A
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECK LIST

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PROJECT Bristol Fish & Game Club Dam

DATE April 29, 1981

PROJECT FEATURE Auxiliary Spillway

BY PMH, JAC, KA

AREA EVALUATED	CONDITION
<u>OUTLET WORKS-SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	Grass lined earth channel @ right end of dam
a) <u>Approach Channel</u>	
General Condition	Good
Loose Rock Overhanging Channel	} None
Trees Overhanging Channel	
Floor of Approach Channel	
Flat- free of debris	
b) <u>Weir and Training Walls</u>	
General Condition of Concrete	} N/A- earth channel
Rust or Staining	
Spalling	
Any Visible Reinforcing	
Any Seepage or Efflorescence	
Drain Holes	grass cover - good condition, side slopes - good
c) <u>Discharge Channel</u>	earth dike left side - good
General Condition	no riprap at right end dam
Loose Rock Overhanging Channel	embankment
Trees Overhanging Channel	} channel discharges to woods at right end of dam. Discharge then flows to outlet channel.
Floor of Channel	
Other Obstructions	

PERIODIC INSPECTION CHECK LIST

Page A-5

PROJECT Bristol Fish & Game Club Dam

DATE April 29, 1981

PROJECT FEATURE 16" RCP Outlet

BY PMH, JAC, MA

AREA EVALUATED	CONDITION
<u>OUTLET WORKS-OUTLET STRUCTURE AND OUTLET CHANNEL</u>	
General Condition of Concrete	16" RCP from riser chamber to d/s toe of embankment (71±')
Rust or Staining	Pipe appears in good condition, hard to observe
Spalling	N/A
Erosion or Cavitation	N/A
Visible Reinforcing	N/A
Any Seepage or Efflorescence	N/A
Condition at Joints	Could not be observed
Drain Holes	N/A
Channel	
Loose Rock or Trees Overhanging Channel	Some small trees
Condition of Discharge Channel	Narrow, natural streambed, fair condition



Photo 1 - Upstream slope from left abutment. Minor sloughing of the upstream slope is occurring at the waterline. Drop inlet can be seen at center of dam (April, 1981).



Photo 2 - Top of dam and downstream slope from left abutment (April, 1981).

US ARMY ENGINEER DIV. NEW ENGLAND
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CAHN ENGINEERS INC.
WALLINGFORD, CONN.
ENGINEER

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

BRISTOL FISH & GAME CLUB
CUSSGUTTER BROOK
WOLCOTT, CT
CE# 27785 KH
DATE JUNE 1981 PAGE C-1



Photo 3 - Top of concrete riser structure. Casing for low-level outlet valve stem is located on upstream side of riser (April, 1981).



Photo 4 - Emergency spillway at right end of dam (April, 1981).

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NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

BRISTOL FISH & GAME CLUB
CHUSGUTTER BROOK
WOLCOTT, CT.
CE# 27785KH
DATE JUNE '81 PAGE C-2

DAM INSPECTION PROGRAM
FORM I INSPECTION REPORT

IDENTIFICATION NO: CT-00280
NAME OF DAM: Schwartz Pond Dam
TOWN: Suffield
COUNTY AND STATE: Hartford County, Connecticut
STREAM: Stony Brook, a tributary of Connecticut River
DATE OF INSPECTION: December 17, 1980

BRIEF ASSESSMENT

The Schwartz Pond Dam is a masonry and concrete structure approximately 128 ft. long, with a top width of 2 ft. and a maximum height of 16 ft.

There is a 3'x4' regulating outlet controlled by a sluice gate which is currently inoperable. The spillway, an overflow portion of the dam, is 86 ft. long with its crest 5.2 ft. below the top of the dam.

Based on visual inspection, the Schwartz Pond Dam is judged to be in fair condition. A feature found existing that could affect the stability of the dam is the deteriorating concrete at the wingwalls, regulating outlet and west dam embankment.

It is recommended that the owner arrange for a qualified registered engineer to do the following within one year of receipt of this report:



Photo 7 - Erosion and sloughing of upstream slope near drop inlet. Note sparse riprap at waterline (April, 1981).

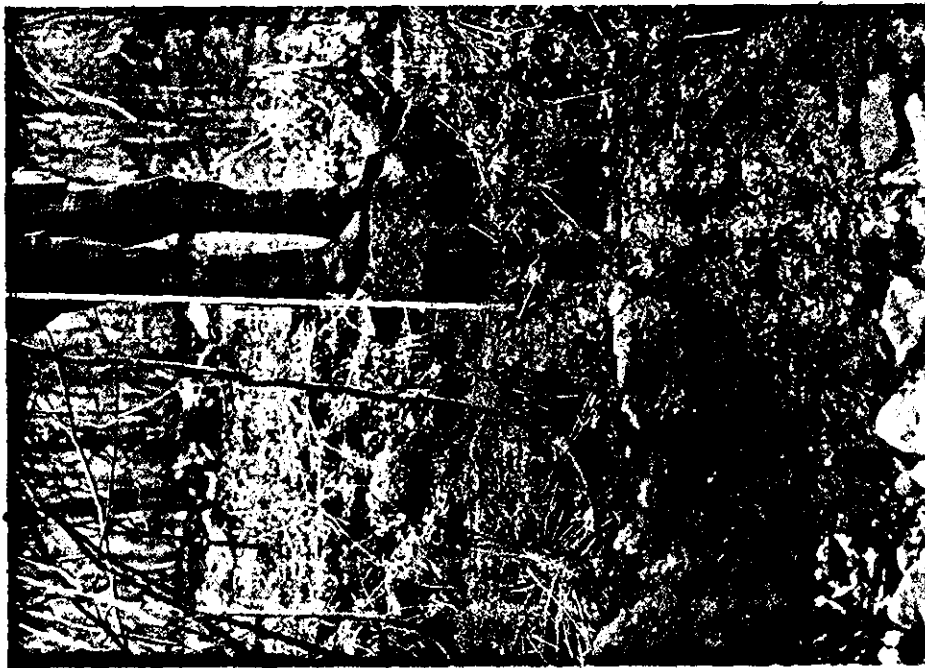


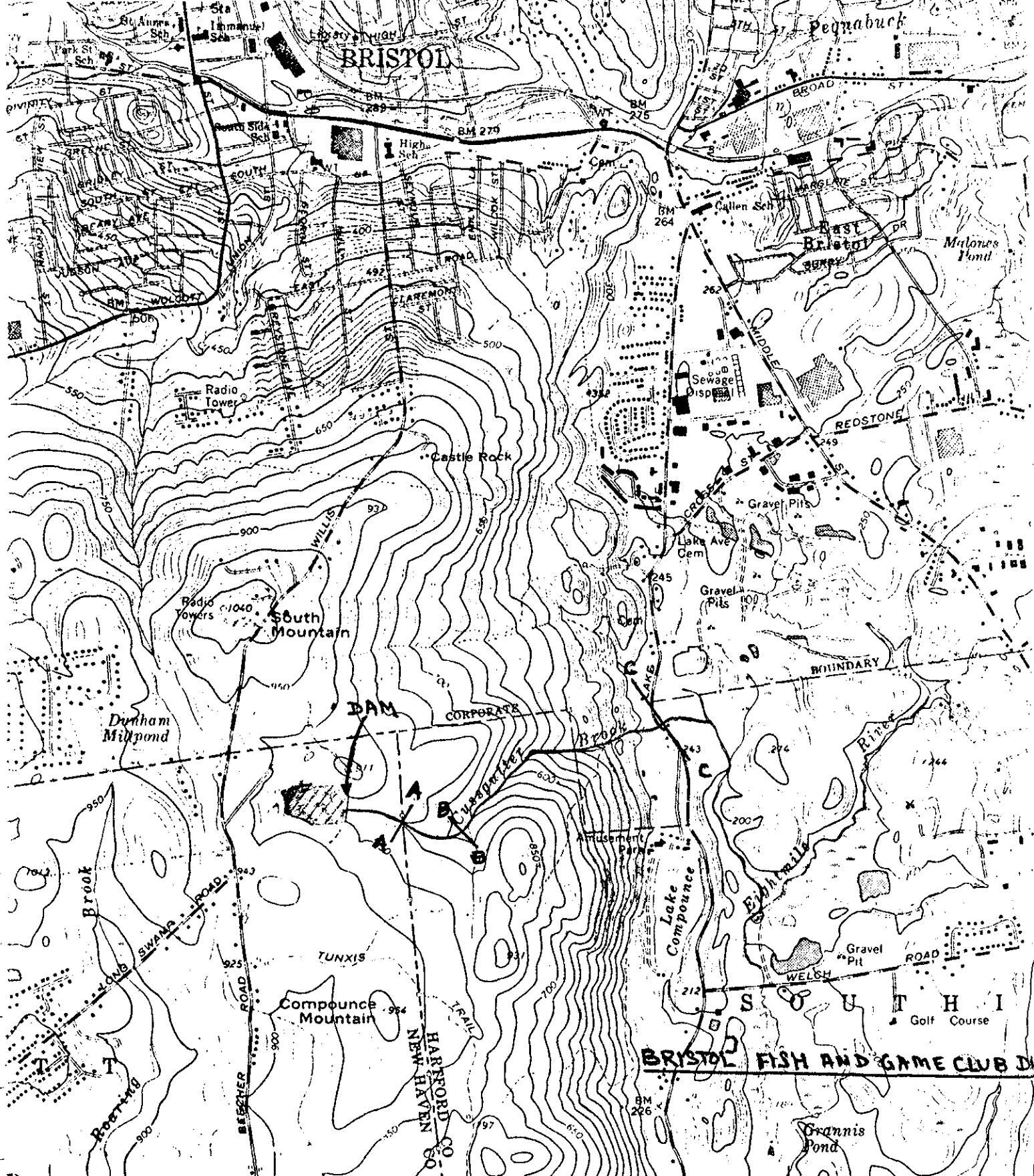
Photo 8 - Seepage at right side of outlet discharge channel. Seepage flows from wet area at toe of embankment to the right of the outlet pipe (April, 1981).

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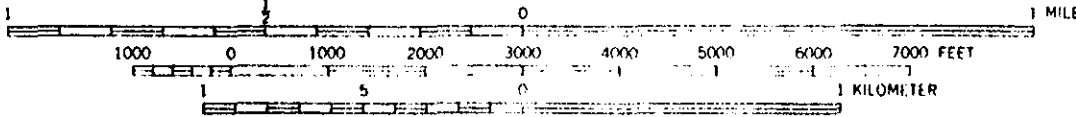
NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

BRISTOL FISH & GAME CLUB
CUSSGUTTER BROOK
WOLCOTT, CT.
CE# 07705KH
DATE JUNE '81 PAGE C-4



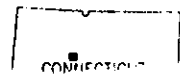
57°30" (SOUTHINGTON) 6467 III SW 673 55' 674000m E 4.3 MI 10.1

SCALE 1:24 000



CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

BRISTOL QUAD



PROJECT NON FEDERAL DAM INSPECTION PROJECT NO. 81-20-11 SHEET 1 OF 20
NEW ENGLAND DIVISION COMPUTED BY [Signature] DATE 5/15/81
BRISTOL FISH AND GAME CLUB DAM CHECKED BY E Butcher Balu DATE 5/16/81

PERFORMANCE AT PEAK FLOOD CONDITIONSPROBABLE MAXIMUM FLOOD (PMF) DETERMINATION-

DRAINAGE AREA - 0.18 SQ. MI. PLANIMETERED FROM
BRISTOL QUAD. SHEET (REV. 1972)

WATERSHED CLASSIFICATION - "ROLLING" TO "MOUNTAINOUS"
BASED UPON USGS MAP AND SITE VISIT.

PMF PEAK INFLOW-

FOR SMALL DRAINAGE AREAS (< 2 SQ. MI.) THE CORPS
OF ENGINEERS RECOMMENDS CSM VALUES TO BE NOT
GREATER THAN 2500 CFS/SQ. MI. FOR THE ABOVE
WATERSHED CONDITIONS.

PEAK FLOW RATE SELECTED = 2500 CFS/SQ. MI.

\therefore PMF PEAK INFLOW = $2500 \times 0.18 = 450$ CFS

SIZE CLASSIFICATION-

FOR THE PURPOSE OF DETERMINING PROJECT SIZE, THE
MAXIMUM STORAGE ELEVATION IS CONSIDERED EQUAL TO
THE STORAGE AT TOP OF DAM

TOP OF DAM ELVN = 865.5 *

TOE OF DAM ELVN = 843.0

HEIGHT OF DAM 22.5 FT.

* The normal w.s. elevation of the Pond is not indicated on
the USGS map. However, examining the contours on
the USGS map as well as elevations given in the
1958 design drawings prepared by SCS, the
normal pond elevation is Assumed to be 861 NAVD
and is assumed to be the same for the principal
spillway crest. All other elevations are referenced to this
assumed elevation and are obtained from the 1958
SCS drawings. Cohn Inc. field checked some of the
key information

PROJECT NON FEDERAL DAM INSPECTION PROJECT NO. 81-20-11 SHEET 2 OF 20
NEW ENGLAND DIVISION COMPUTED BY [Signature] DATE 2/15/81
BRISTOL FISH AND GAME CLUB DAM CHECKED BY E. Butcher Balon DATE 5/16/81

PLANIMETERING FROM USGS MAP FOR POND SURFACE AREAS —
AT EL. 861 (Pr. Spillway Crest) = 12 ACRES
AT EL 870 = 15 ACRES
AT EL 880 = 21 ACRES

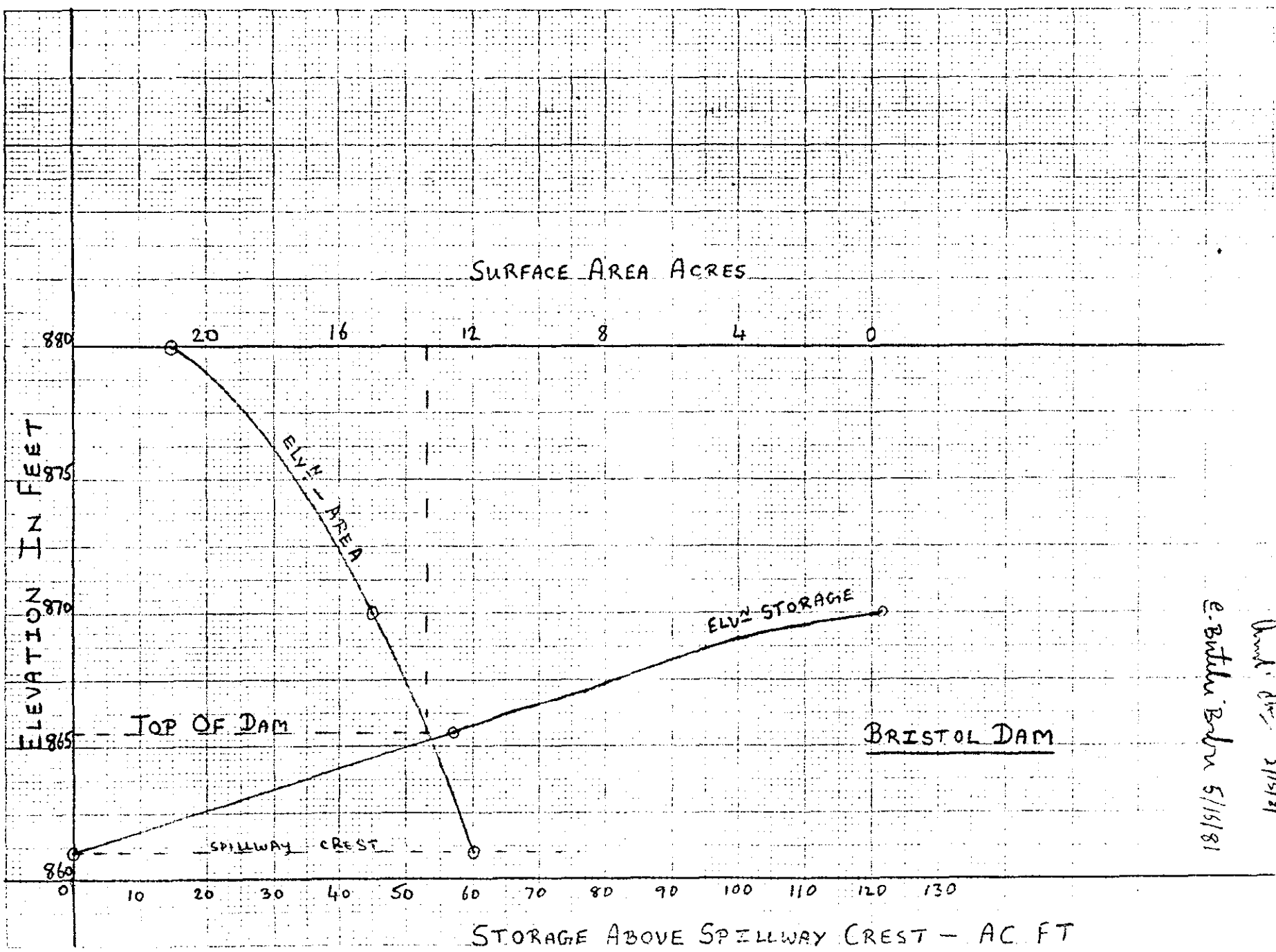
A STAGE-POND AREA CURVE IS PLOTTED (SHEET 3)
FROM THIS CURVE, POND AREA AT TOP OF DAM = 13.4 AC.
AVERAGE POND AREA BETWEEN PR. SPILLWAY
CREST AND TOP OF DAM = 12.7 AC.
∴ STORAGE BETWEEN PRINCIPAL SPILLWAY CREST
AND TOP OF DAM = $4.5 \times 12.7 \approx 57 \text{ AC.FT.}$
STORAGE BETWEEN PRINCIPAL SPILLWAY
CREST AND POND AT EL 870 = 121.5 AC.FT.
EST. STORAGE BELOW PR. SPILLWAY CREST = $\frac{1}{3} b h$
= $\frac{1}{3} \times 12 \times 18 = 72 \text{ AC.FT.}$

($b = 12$, $h = \text{EL. } 861 - \text{EL. } 843 = 18'$)

∴ MAXIMUM IMPOUNDMENT TO TOP OF DAM = $57 + 72$
= 129 AC.FT.

A STAGE-STORAGE CURVE IS PLOTTED ON SHEET 3.
THUS, ACCORDING TO CORPS OF ENGINEERS GUIDE
LINES TABLE 1, THE BRISTOL CLUB DAM IS
CLASSIFIED SMALL BASED UPON THE STORAGE
CAPACITY OF 129 AC.FT. (< 1000 AND ≥ 50)
AND THE HEIGHT OF THE DAM IS ONLY
22.5 FT.

C-7



SHEET 3 OF 20
Dated May 5/15/81
e-Britain Bldg 5/15/81

PROJECT NON FEDERAL DAM INSPECTION PROJECT NO. 81-20-11 SHEET 4 OF 20
NEW ENGLAND DIVISION COMPUTED BY [Signature] DATE 5/15/81
BRISTOL FISH AND GAME CLUB DAM CHECKED BY E Butcher Babu DATE 5/16/81

HAZARD POTENTIAL - LOW

HAZARD POTENTIAL
BASED UPON DAM BREACH ANALYSIS AND ACTIVITIES
BELOW THE DAM. A DETAILED DISCUSSION OF
HAZARD POTENTIAL IS INCLUDED AT THE END
OF BREACH ANALYSIS SECTION OF APPENDIX D.

SELECTION OF TEST FLOOD -

FOR THE SMALL SIZE AND LOW HAZARD
POTENTIAL CLASSIFICATION, TABLE 3 OF CORPS
OF ENGINEERS RECOMMENDED GUIDELINES, THE
TEST FLOOD COULD BE IN THE 50 YEAR
TO 100 YEAR FREQUENCY RANGE.

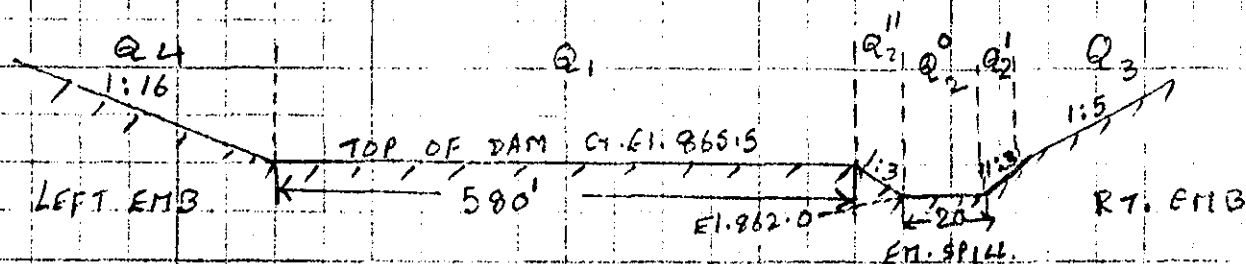
BASED UPON THE INVOLVED RISK POTENTIAL
DOWNSTREAM OF THE DAM, A TEST FLOOD
= 100 YR IS SELECTED.

$$\therefore \text{TEST FLOOD PEAK INFLOW} = \frac{5}{19} \times 450 \\ \approx \underline{120} \text{ CFS.}$$

NOTE: PMF OF 450 CFS IS ESTIMATED TO RESULT
FROM 19" RUN-OFF AND A 100 YEAR
FLOOD IN CONNECTICUT IS ESTIMATED TO
RESULT FROM APPROXIMATELY 5" RUN-OFF.

PROJECT: NON FEDERAL DAM INSPECTION PROJECT NO. 81-20-11 SHEET 5 OF 20
NEW ENGLAND DIVISION COMPUTED BY: [Signature] DATE 5/15/81
BRISTOL FISH AND GAME CLUB DAM CHECKED BY: E. Butcher Balon DATE 5/16/81

COMPOSITE DISCHARGE RATING CURVE



APPROXIMATE POTENTIAL OVERFLOW PROFILE

BASED ON DESIGN DRAWINGS & CAHN INC'S FIELD INFORMATION
(LOOKING DOWNSTREAM)

DAM

$$Q_1 = CLH^{3/2} = 162.4 H^{3/2}$$

C = 2.8 ASSUMED (EARTHEN)
L = 580' , CL = 865.5

EMERGENCY SPILLWAY

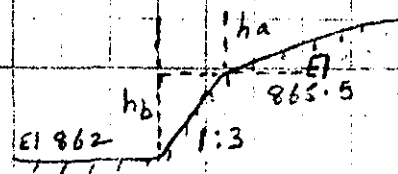
$$Q_2^0 = CLH^{3/2} = 5.6 H^{3/2}$$

C = 2.8 ASSUMED (GRASS)
L = 20' , CL = 862.0

$$Q_2' = \frac{2}{5} \frac{CL}{(h_b - h_a)^{5/2}} (h_b^{5/2} - h_a^{5/2})^*$$

$$= 0.4 \times 2.8 \times 3 \times h_b^{5/2} \text{ upto EL. 865.5}$$

$$= 3.36 h_b^{5/2}$$



SIMILARLY $Q_2'' = 3.36 h_b^{5/2}$
 $\therefore Q_2' + Q_2'' = 6.72 h_b^{5/2}$

*NOTE: USGS RECOMMENDED FORMULA FOR MORE PRECISE DISCHARGE OVER INCLINED DAM/EMBANKMENT CREST (REF: MEASUREMENT OF PEAK DISCHARGES AT DAM BY INDIRECT METHODS. USGS BOOK 3, CHAPTER A 5, PAGE 3-4, 1968)

PROJECT NON FEDERAL DAM INSPECTION PROJECT NO. 81-20-11 SHEET 6 OF 20
NEW ENGLAND DIVISION COMPUTED BY [Signature] DATE 5/15/81
BRISTOL FISH AND GAME CLUB DAM CHECKED BY [Signature] DATE 5/16/81

PRINCIPAL SPILLWAY:

PIPE SPILLWAY WITH DROP INLET

$$Q_{ps} = a \sqrt{\frac{2gH}{1 + K_e + K_b + K_p L}}$$

(Ref: "Hand Book of Applied Hydrology" by Ven Te Chow
p - 21-63)

FOR CONCRETE PIPE

Pipe diameter = 16"

$n = 0.015$, $K_e = 0.5$

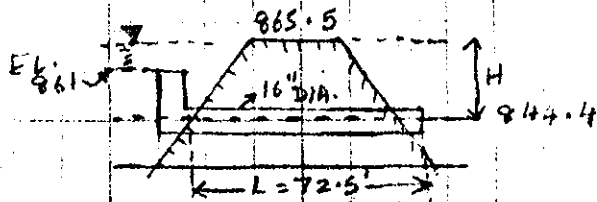
Area of cross section of pipe

$K_b = 0$, $K_p = 0.0301$, $L = 72.5'$

= 1.39 sq. ft.

FOR FULL FLOW CONDITION

$$Q = 5.81 H^{1/2}$$



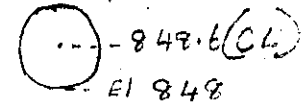
LOW LEVEL OUTLET

$$Q_o = CA \sqrt{2gH}$$

$$= 8.51 H^{1/2}$$

= 35 CFS FOR POOL
AT TOP OF DAM

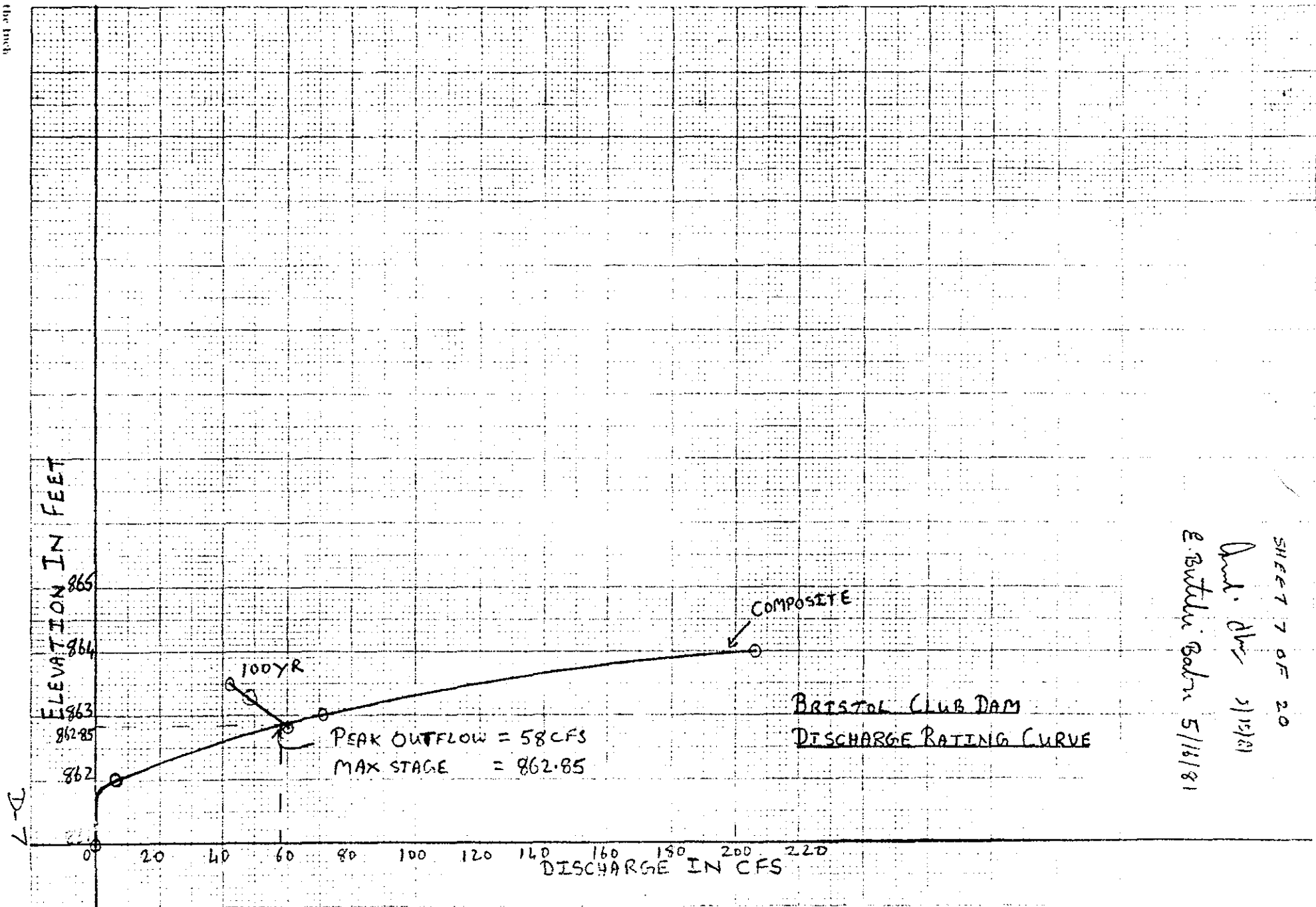
14" PIPE



THE LOW LEVEL OUTLET IS PART OF THE PRINCIPAL SPILLWAY STRUCTURE AND ITS EFFECT ON THE DISCHARGE CAPACITY OF THE SPILLWAY IS NEGLECTED. THE FLOW THROUGH THE LOW LEVEL OUTLET IS CONSIDERED INCONSEQUENTIAL IN THIS ANALYSIS, WHILE THE PRINCIPAL SPILLWAY IS OPERATING.

TABULATION OF DISCHARGE RATES (CFS)

ELVN NGVD	DAM Q_1	EMER. SPILLWAY Q_2^o	$Q_2^I + Q_2^{II}$	Q_2	PRINCIPAL SP. WAY Q_{ps}	TOTAL Q
PR. SPILL 861	0	0	0	0	0	0
862	0	0	0	0	6	6
TEST. FLOW 862.85	0	45	5	50	8	58
863	0	56	7	63	9	72
864	0	158	38	196	10	206



SHEET 7 OF 20
 Date: Apr 3/1981
 E. Butlin Bohn 5/16/81

PROJECT NON FEDERAL DAM INSPECTION PROJECT NO. 81-20-11 SHEET 8 OF 20
NEW ENGLAND DIVISION COMPUTED BY And. Nor DATE 5/15/81
BRISTOL FISH AND GAME CLUB DAM CHECKED BY E. Butcher-Baker DATE 5/16/81

DETERMINATION OF PEAK OUTFLOW -

SHORTCUT ROUTING OF POND

CORPS OF ENGINEERS GUIDELINES SURCHARGE STORAGE
ROUTING ALTERNATIVE METHOD USED

FOR 120 CFS (100 YR) THE DISCHARGE RATING CURVE
GIVES ELVN = 863.5

AND FROM STAGE-STORAGE CURVE FOR THIS ELVN
STORAGE = 31 AC.FT.

$$\text{STOR}_i = \frac{31 \times 12}{0.18 \times 640} = 3.23'' \text{ RUN-OFF.}$$

$$Q_{P_i} = Q_{P_i} \left(1 - \frac{\text{STOR}_i}{5} \right)$$

① STOR _i INCHES	② $\left(1 - \frac{\text{STOR}_i}{5} \right)$	③ STOR _i AC.FT ① $\frac{0.18 \times 640}{12}$	④ Q _{P_i} CFS ① $\times 120$	⑤ ELVN FROM STORAGE CURVE USING ②
2.5	0.5	24	60	862.85
3.00	0.4	29	48	863.25
3.23	0.35	31	42	863.5

COLUMNS ④ & ⑤ ARE PLOTTED ON DISCHARGE RATING
CURVE AND

$$\text{PEAK OUTFLOW } Q = 58 \text{ CFS}$$

$$\text{MAXIMUM STAGE} = 862.85 \text{ NGVD}$$

$$\text{TOP OF DAM} = 865.5 \text{ NGVD}$$

∴ THE DAM IS NOT OVERTOPPED.

PROJECT NON FEDERAL DAM INSPECTION PROJECT NO. 81-20-11 SHEET 9 OF 20
NEW ENGLAND DIVISION COMPUTED BY Wm. J. Clark DATE 5/14/81
BRISTOL FISH AND GAME CLUB DAM CHECKED BY E. Butler Bohn DATE 5/15/81

BREACH ANALYSIS — DOWNSTREAM FAILURE HAZARD

BASED UPON CORPS OF ENGINEERS "RULE OF THUMB"
GUIDANCE FOR ESTIMATING D/S DAM FAILURE
HYDROGRAPHS

$$\text{BREACH OUTFLOW } Q_b = \frac{8}{27} \times W_b \times \sqrt{g} \times Y_0^{3/2}$$

HEIGHT FROM CHANNEL BED TO POOL @ TOP OF DAM Y_0
 $= 22.5 \text{ FT.}$

ESTIMATED BREACH WIDTH $W_b = 40\%$ OF MID-HT LENGTH
OF DAM $= 0.4 \times 265 = 106 \text{ FT}$

(MID HEIGHT LENGTH IS BASED UPON SCS DESIGN DRAWINGS)

$$\therefore Q_b = \frac{8}{27} \times 106 \times \sqrt{32.2} \times (22.5)^{3/2} \approx 19,020 \text{ CFS}$$

IT IS PRESUMED THAT THE BREACH OCCURS IN DEEPEST
SECTION OF THE DAM. THIS SECTION INCLUDES THE
PRINCIPAL SPILLWAY AS WELL AS THE LOW LEVEL OUTLET.
THE ESTIMATED DISCHARGE THROUGH EMERGENCY
SPILLWAY WITH POOL AT TOP OF THE DAM = 521 CFS
 \therefore PEAK FAILURE OUTFLOW $Q_p = 19,020 + 521 \approx 19,600$
CFS

ESTIMATED FAILURE FLOOD DEPTH $\approx 0.44 Y_0$
IMMEDIATELY D/S FROM DAM $\approx 10 \text{ FT}$

PROJECT NON FEDERAL DAM INSPECTION PROJECT NO. 81-20-11 SHEET 10 OF 20
NEW ENGLAND DIVISION COMPUTED BY Am. B. DATE 5/14/81
BRISTOL FISH AND GAME CLUB DAM CHECKED BY E. Butcher B. Jr. DATE 5/15/81

PERFORM DIS ROUTING OF PEAK FAILURE OUTFLOW
SECTION AA IS SELECTED AT 1000 FT DIS OF DAM

$$Q = \frac{1.486}{n} \times A \times R^{2/3} \times S^{1/2} \quad \text{Where } n = 0.06 \text{ assumed (stones, windy)} \\ \text{and } S = 0.043 \text{ Est. from USGS map.}$$

$$= 5.136 A R^{2/3}$$

A AND R ARE ESTIMATED BASED UPON USGS MAP INFORM.

ELVN	A SQ. FT	P	R	R ^{2/3}	Q - CFS
800	0	-	-	-	0
802	38	38.2	0.995	0.997	195
805	237.5	95.5	2.49	1.838	2242
808	614	154.3	3.98	2.513	7925
810	950	191	4.97	2.914	14,218
811	1151	213.1	5.40	3.08	18,208
812	1372	233	5.9	3.3	23,255

FROM STAGE-AREA AND STAGE DISCHARGE CURVES

FOR $Q_{P1} = 19,600 \text{ CFS}$, ELVN = 811.25, AREA = 1206 SQ. FT.

$$\text{VOLUME OF REACH } V_1 = \frac{1000 \times 1206}{43.560} \approx 28 \text{ AC. FT.}$$

$$\text{TRIAL } Q_{P2} = Q_{P1} \left(1 - \frac{V_1}{S}\right) = 19,600 \left(1 - \frac{28}{129}\right) = 15,350 \text{ CFS}$$

FOR THIS Q_{P2} THE STAGE-DISCHARGE CURVE GIVES ELVN = 810.25

$$\text{AND AREA} = 998 \text{ SQ. FT.}$$

$$\text{VOLUME OF REACH } V_2 = \frac{1000 \times 998}{43.560} \approx 23 \text{ AC. FT.}$$

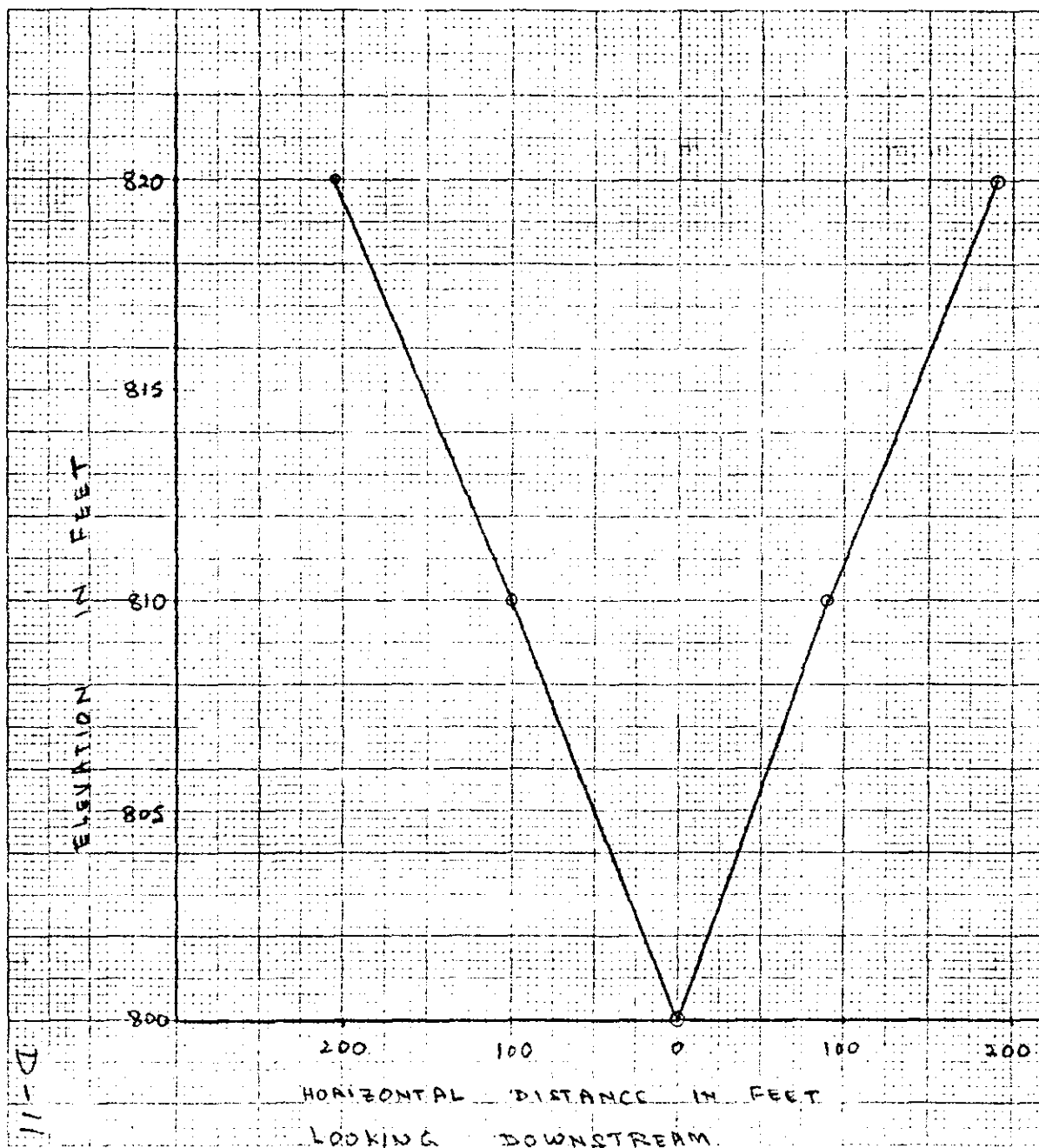
$$\text{RECOMPUTING } Q_{P2} = 19,600 \left(1 - \frac{28+23}{129}\right) = 15,725 \text{ CFS}$$

$$\text{PEAK OUTFLOW } Q_{P2} = 15,725 \text{ CFS}$$

$$\text{FLOOD STAGE AT SECTION AA} = 810.4 \text{ NGVD}$$

$$\text{FLOOD DEPTH AT SECTION AA} = 810.4 - 800 = 10.4 \text{ FT}$$

$$\text{VELOCITY AT SECTION AA} = \frac{15,725}{1028} \approx 15 \text{ FPS}$$

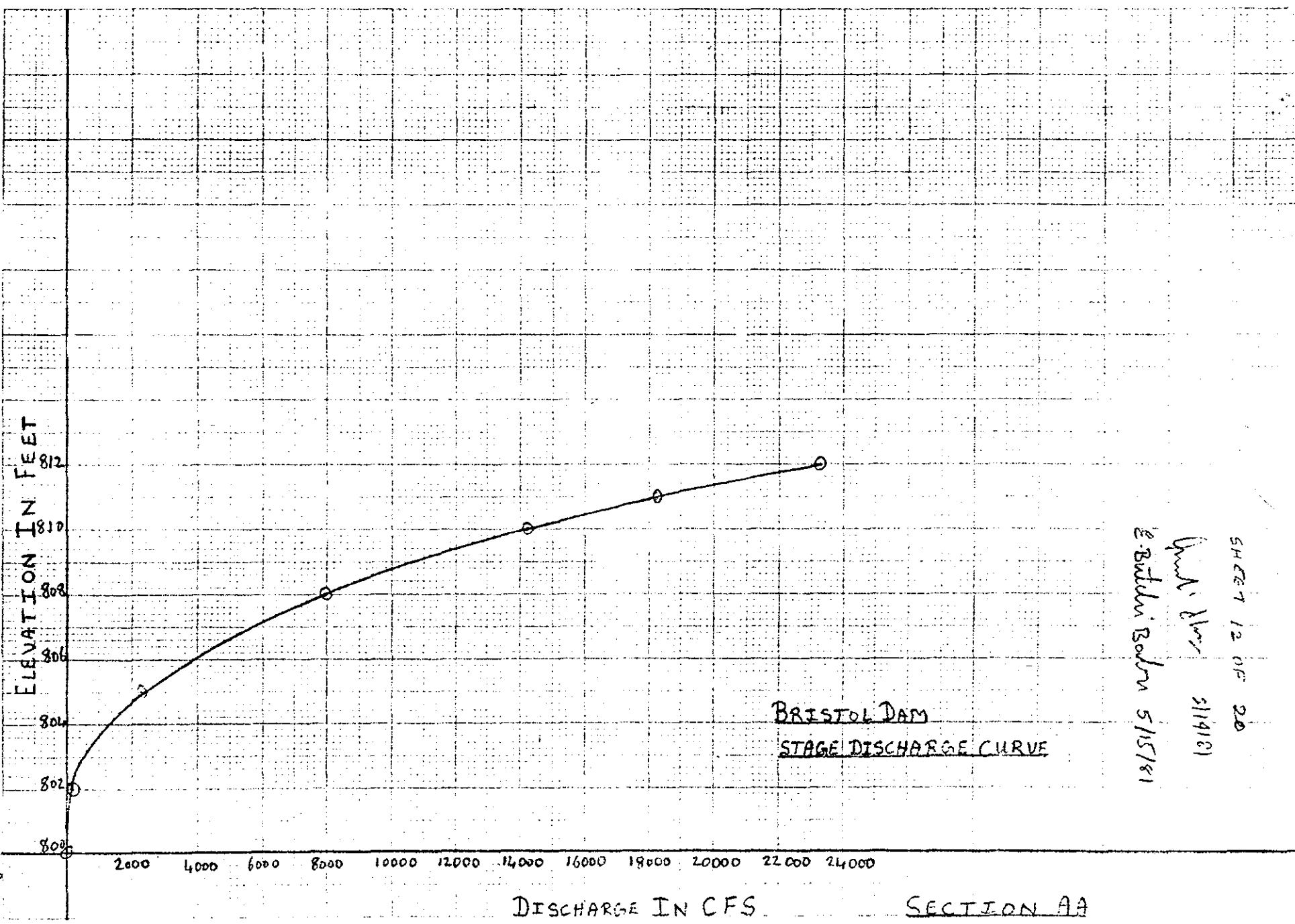


BRISTOL DAM
STAGE-AREA CURVE
SECTION AA

SHEET 11 OF 20
June 1951
E. Butler, Jr. 5/15/81

D-11

Sheet 12 of 20



BRISTOL DAM
STAGE DISCHARGE CURVE

SHEET 12 OF 20
J. A. B. 5/19/61
E. B. B. 5/15/61

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DISCHARGE IN CFS SECTION AA

PROJECT NON FEDERAL DAM INSPECTION PROJECT NO. 81-20-11 SHEET 13 OF 20
NEW ENGLAND DIVISION
COMPUTED BY [Signature] DATE 5/19/81
BRISTOL FISH AND GAME CLUB DAM CHECKED BY E. Butcher DATE 5/15/81

SELECTING A SECTION BB 900' D/S OF SECTION AA

$$Q = \frac{1.486}{n} \times A \times R^{2/3} \times S^{1/2} \quad \text{Where } n = 0.06 \text{ assumed}$$

$$S = 0.07 \text{ based on USGS map.}$$

$$= 6.553 A R^{2/3}$$

ELVN	A	P	R	$R^{2/3}$	Q
730	0	-	-	-	0
734	185	92.85	1.992	1.584	1920
736	418.5	140.02	2.989	2.076	5693
738	740	185.7	3.985	2.515	12,196
740	1150	230.9	4.981	2.918	21,990

STAGE AREA AND STAGE DISCHARGE CURVES ARE PLOTTED -
FOR $Q_{P1} = 15,725$ CFS, ELVN = 738.8, AND AREA = 898 SQ. FT.

$$\text{VOLUME OF REACH } V_1 = \frac{900 \times 898}{43.560} \approx 18.5 \text{ AC} \cdot \text{FT}$$

$$\text{TRIAL } Q_{P2} = Q_{P1} \left(1 - \frac{V_1}{S}\right) = 15,725 \left(1 - \frac{18.5}{129}\right) = 13,470 \text{ CFS}$$

FOR 13,470 CFS, ELVN = 738.35 AND AREA = 810 SQ. FT.

$$\text{VOLUME OF REACH } V_2 = \frac{900 \times 810}{43.560} \approx 16.75 \text{ AC} \cdot \text{FT}$$

$$\text{RECOMPUTING } Q_{P2} = 15,725 \left(1 - \frac{18.5 + 16.75}{2 \times 129}\right) \approx 13,575 \text{ CFS}$$

$$\text{PEAK OUTFLOW } Q_{P2} = 13,575 \text{ CFS}$$

$$\text{FLOOD STAGE AT SECTION BB} = 738.4 \text{ NGVD}$$

$$\text{FLOOD DEPTH AT SECTION BB} = 738.4 - 730 = 8.4 \text{ FT}$$

$$\text{VELOCITY AT SECTION BB} = \frac{13,575}{819} \approx 16.5 \text{ FPS}$$

ELEVATION IN FEET

750

745

740

735

730

200

100

0

100

200

HORIZONTAL DISTANCE IN FEET

LOOKING DOWNSTREAM

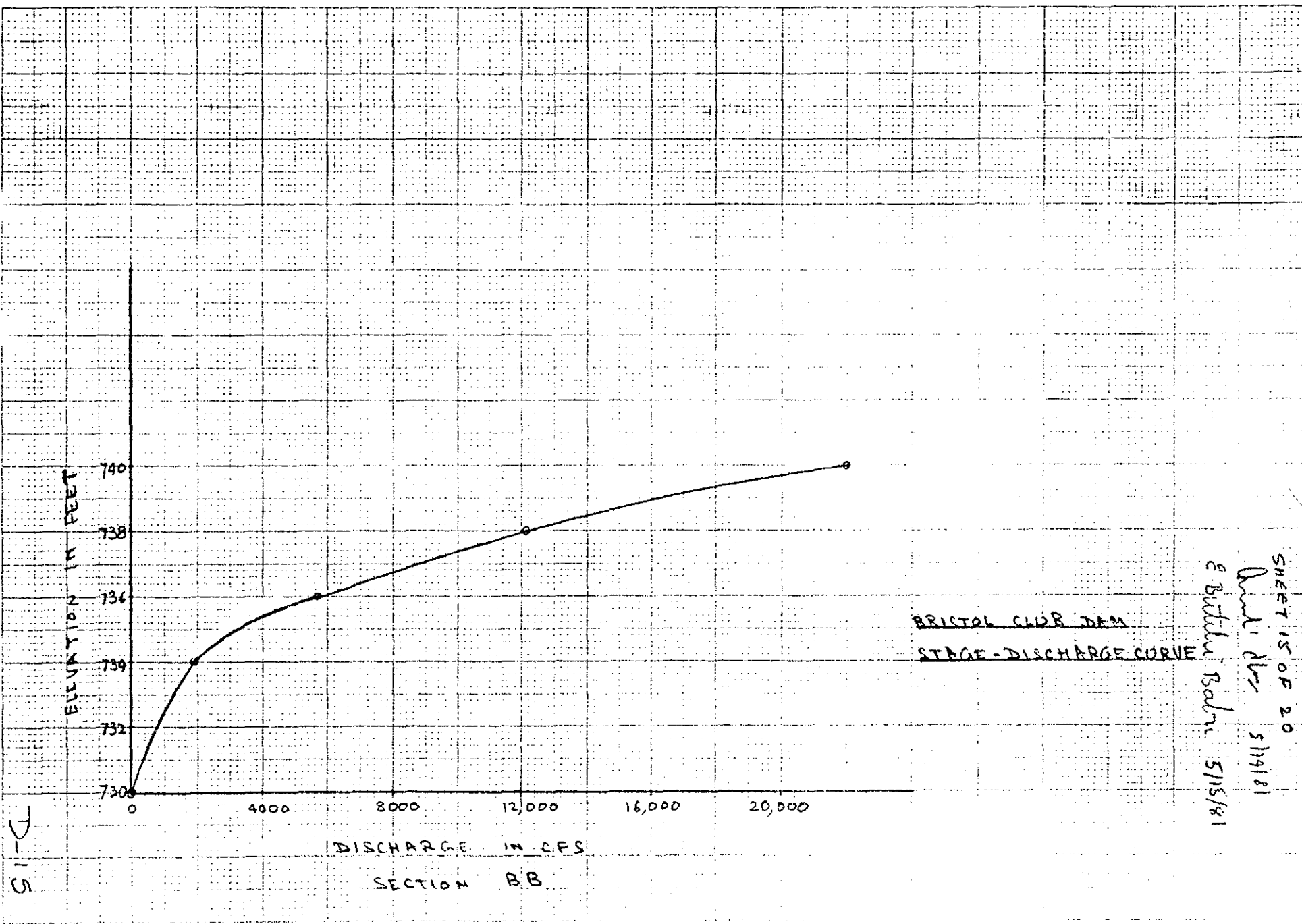
BRISTOL CLUB DAM
STATE-AREA CURVE
SECTION BB

SHEET 14 OF 20

June 1971

E. Butler Balda 5/15/81

D-14



BRISTOL CLUB DAM
STAGE-DISCHARGE CURVE

SHEET 15 OF 20
June 1981
E. Butler Radin 5/15/81

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PROJECT NON FEDERAL DAM INSPECTION PROJECT NO. 81-20-11 SHEET 16 OF 20
NEW ENGLAND DIVISION COMPUTED BY [Signature] DATE 5/14/81
BRISTOL FISH AND GAME CLUB DAM CHECKED BY E. Butcher DATE 5/15/81

SELECT A SECTION CC 3700' D/S OF SECTION BB

A CONSIDERABLE REACH LENGTH (3300'±) BELOW SECTION BB IS EXTREMELY STEEP AND NARROW. THEREFORE, ATTENUATION OF STORAGE VOLUME IS CONSIDERED NEGLIGIBLE. THE REACH LENGTH USED IN THIS ANALYSIS IS THEREFORE 400'.

$$Q = \frac{1.486}{n} \times A \times R^{2/3} \times S^{1/2}$$

$$= \frac{6.443}{n} A R^{2/3}$$

Where $n = 0.05$ assumed
 $S = 0.047$ Est. from USGS map.

ELVN	A SQ. FT	P	R	$R^{2/3}$	Q CFS
230	0	—	—	—	—
232	210	210	1	1	1350
234	820	410	2	1.59	8400
235	1312	525	2.5	1.84	15,555

STAGE AREA AND STAGE DISCHARGE CURVES ARE PLOTTED FOR $Q_{P1} = 13,575$ CFS, ELVN = 234.75 & AREA = 1188 SQ. FT.
 VOLUME OF REACH $V_1 = \frac{400 \times 1188}{43.560} \approx 11$ AC. FT.

TRIAL $Q_{P2} = Q_{P1} \left(1 - \frac{V_1}{S}\right) = 13,575 \left(1 - \frac{11}{129}\right) \approx 12,400$ CFS
 FOR 12,400 CFS, ELVN = 234.6 & AREA = 1104 SQ. FT.
 ∴ VOLUME OF REACH $V_2 = \frac{400 \times 1104}{43.560} \approx 10$ AC. FT.

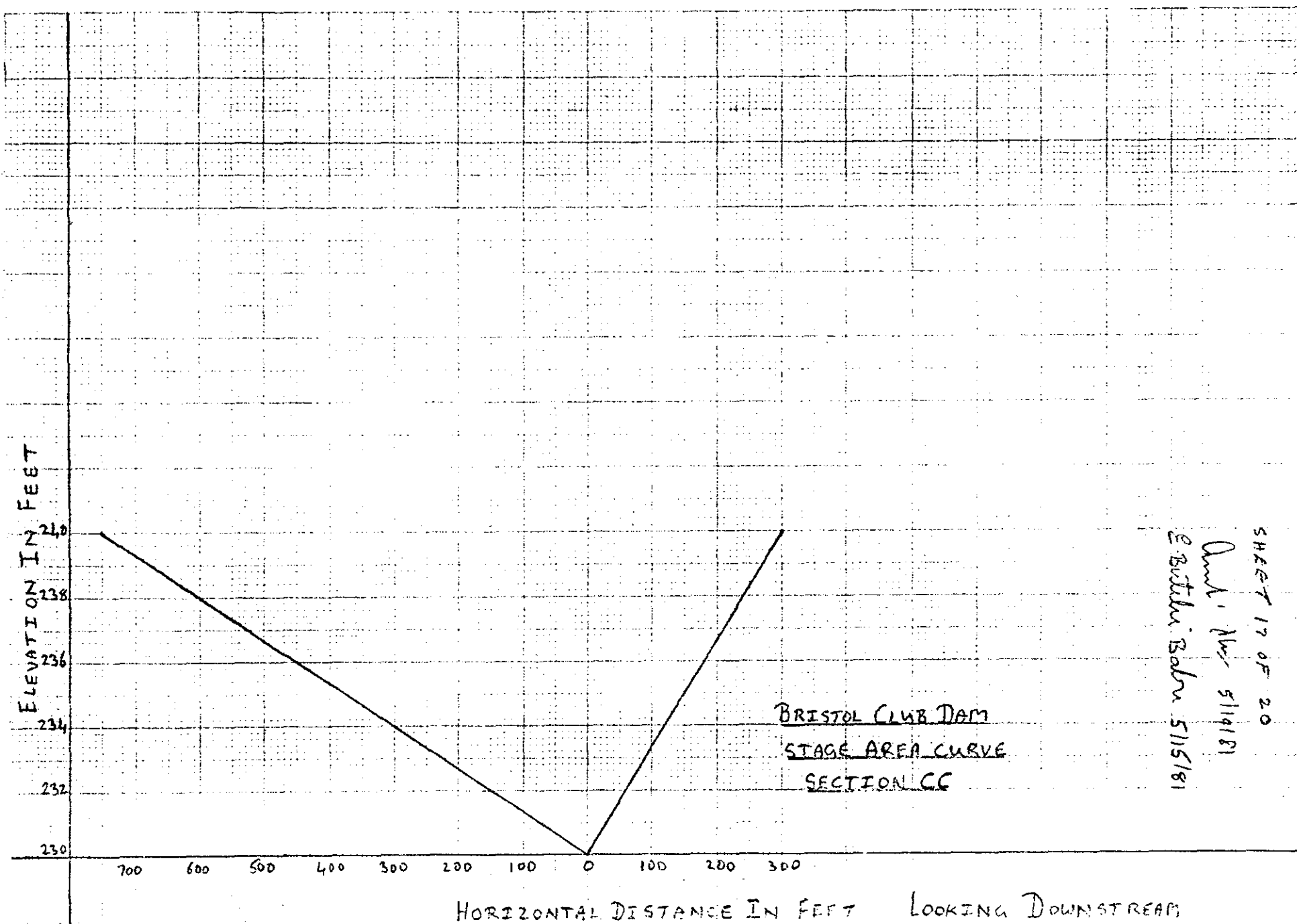
RECOMPUTING $Q_{P2} = 13,575 \left(1 - \frac{11+10}{2 \times 129}\right) \approx 12,400$ CFS

PEAK OUTFLOW $Q_{P2} = 12,400$ CFS

FLOOD STAGE AT SECTION CC = 234.6 NGVD

FLOOD DEPTH AT SECTION CC = 234.6 - 230 = 4.6 FT.

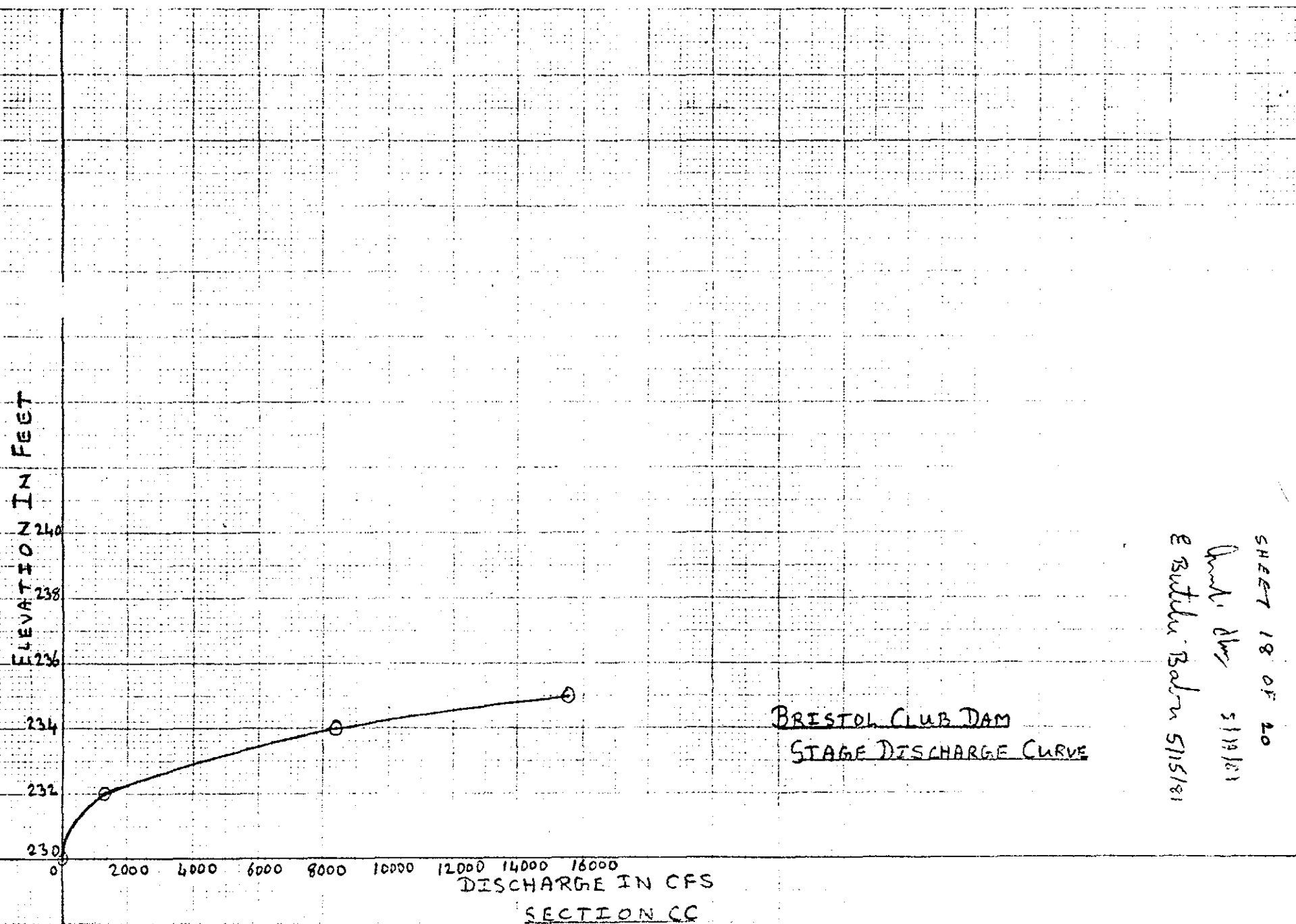
VELOCITY AT SECTION CC = $\frac{12,400}{1104} \approx 11$ FPS



SHEET 17 OF 20
Dated Nov 5/19/81
E. Butler Bohn 5/15/81

Done. 5/19/81

E Butte, Baden 5/15/81



PROJECT NON FEDERAL DAM INSPECTION PROJECT NO. 81-20-11 SHEET 19 OF 23
NEW ENGLAND DIVISION COMPUTED BY [Signature] DATE 5/14/91
BRISTOL FISH AND GAME CLUB DAM CHECKED BY E. Butcher DATE 5/16/91

FAILURE HAZARD POTENTIAL

BASED UPON THE EXISTING INFORMATION, THE LOWEST SECTION OF THE DAM APPEARS TO BE IN THE VICINITY OF THE PRINCIPAL SPILLWAY WITH LOW LEVEL OUTLET AND HENCE IT IS PRESUMED THAT BREACH OF THE DAM WOULD OCCUR IN THIS VICINITY.

THE FAILURE ANALYSIS WAS PERFORMED WITH POOL AT TOP OF DAM (EL. 865.5 NGVD).

SUMMARY OF BREACH ANALYSIS RESULTS:

LOCATION	DISTANCE FROM DAM, FT.	PEAK FLOW RATE, CFS	FLOOD STAGE, NGVD	FLOOD DEPTH, FT	VELOCITY FPS.
DAM	0	19,600	853.0	10.0	—
AA	1000	15,725	810.4	10.4	15
BB	1900	13,575	738.4	8.4	16.5
CC	5600	12,400	234.6	4.6	11

A CONSIDERABLE PORTION OF THE CUSSGUTTER BROOK DOWNSTREAM OF THE DAM TRAVERSES THROUGH THE BRISTOL FISH AND GAME CLUB PROPERTY AND HUNTING, FISHING AND HIKING ACTIVITIES TAKE PLACE IN THIS REACH. AT DAM BREACH CONDITION, THE FLOOD DEPTHS IN THIS REACH IS ESTIMATED TO BE 10.4 FT. (SECTION AA) AND 8.4 FT (SECTION BB) WITH VERY HIGH VELOCITIES (15-16.5 FPS).

FURTHER, DOWNSTREAM, THE BRIDGE ON LAKE AVE. WITH AN OPENING OF 3' X 11' IS LIKELY TO BE IMPACTED WITH HIGH VELOCITY (11 FPS) FLOW OF 12,400 CFS. IN ADDITION, THERE ARE 3 HOUSES ADJACENT TO THE BROOK ON LAKE AVE. WITH 1ST FLOOR ELEVATIONS BETWEEN 7' TO 8.5' WHICH COULD HAVE SOME CELLAR FLOODING.

SINCE, OVERNIGHT CAMPING ON CLUB PROPERTY IS NOT PERMITTED, LOSS OF LIFE FROM DAM FAILURE IS UNLIKELY. HENCE, A HAZARD POTENTIAL OF LOW MAGNITUDE IS CONSIDERED LIKELY.

PROJECT NON FEDERAL DAM INSPECTION PROJECT NO. 81-20-11 SHEET 20 OF 20
NEW ENGLAND DIVISION COMPUTED BY [Signature] DATE 5/6/81
BRISTOL FISH AND GAME CLUB DAM CHECKED BY E. Butcher DATE 5/6/81

SUMMARY- HYDRAULIC/HYDROLOGIC COMPUTATIONS

PERFORMANCE AT PEAK FLOOD CONDITIONS

TEST FLOOD	100 YR
PEAK INFLOW	120 CFS
PEAK OUTFLOW	58 CFS
PRINC. SPILL. CAP TO TOP OF DAM (EL. 865.5 NGVD)	27 CFS
PRINC. SP. CAP. TO TOP OF DAM % OF PEAK OUTFLOW	47
PRINC. SP. CAP. TO PEAK FLOOD ELVN 862.85 NGVD	8 CFS
PRINC. SP. CAP. TO PEAK FLOOD ELVN % OF PEAK OUTFLOW	14
EMERGENCY SP. CAP. TO PEAK FLOOD ELVN	50 CFS
EMERGENCY SP. CAP. TO PEAK FLOOD EL % OF PEAK OUTFLOW	86

PERFORMANCE:

MAXIMUM POOL ELVN	862.85 NGVD
MAX. SURCHARGE HEIGHT ABOVE PRINC. SP. CREST	1.85 FT
NON-OVERFLOW SECTION OF THE DAM OVERTOPPED	NO

DOWNSTREAM FAILURE CONDITIONS

PEAK FAILURE OUTFLOW	19,600 CFS
FLOOD DEPTH IMMEDIATELY D/S FROM DAM	10 FT
CONDITIONS AT THE IMPACT AREA: SECTION CC (LAKE AVE)	
(STREAM BED EL. 230)	
EST. STAGE BEFORE FAILURE	230.4 NGVD
EST. STAGE AFTER FAILURE WITH 12,400 CFS	234.6 NGVD
EST. RAISE IN STAGE AFTER FAILURE ΔY_1	4.2 FT

SANDY HOOK DAM
CT 00311

HOUSATONIC RIVER BASIN
NEWTOWN, CONNECTICUT

The original hardcopy version of this report
contains color photographs and/or drawings.
For additional information on this report
please email

U.S. Army Corps of Engineers
New England District
Email: Library@nae02.usace.army.mil

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00311	2. GOVT ACCESSION NO. ADA 144 298	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Sandy Hook Dam		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE January 1980
		13. NUMBER OF PAGES 25
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18. SUPPLEMENTARY NOTES Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Housatonic River Basin Newtown, Connecticut		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Sandy Hook Dam consists of a stone masonry, earth, and concrete structure with a total length of 185 feet and a height from streambed to abutment of 35 feet. The dam appears to be in fair condition and requires some work. It is classified as a low hazard potential. It is classified as small in size.		

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APPENDIX C	HYDROLOGIC COMPUTATIONS
APPENDIX D	INVENTORY FORMS

DESCRIPTION

SANDY HOOK DAM
CT 00311
TOWN OF NEWTOWN, COUNTY OF FAIRFIELD
ON THE PODTATUCK RIVER
OWNED AND OPERATED BY EARTH BOUND, INC.

The Sandy Hook Dam consists of a stone masonry, earth, and concrete structure with a total length of 185 feet and a height from streambed to abutment of 35 feet. The dam was originally constructed in 1870 (from plaque on dam) as a stone masonry structure. The concrete face, walls, deck and intake structure were added at a later date. The downstream face of the right end of the dam had been covered with earth, but the failure of a downstream retaining wall has exposed the original stone masonry.

The overflow spillway section is 80 feet long and is interrupted by a 6-foot wide intake structure. The intake structure contains the gate and manual operator for the blowoff. The blowoff consists of a 30-inch pipe through the concrete portion of the dam and a 48 x 55-inch arch through the stone masonry portion of the dam.

Two sluice gates with manual operators located near the right end of the dam control the intake to a 72-inch diameter riveted steel conduit which transports water to a turbine. All gates are operational.

The dam is owned and operated by Earth Bound, Inc., a health food distributor. The dam was originally used to store water for generating electricity for a manufacturing plant. The present

owner plans to rebuild the generating unit and put it back into service.

The dam appears to be in fair condition and requires some work.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

The Sandy Hook Dam has a tributary watershed of 24.8 square miles, a spillway capacity of 4,800 cfs, and a water surface area at spillway elevation of 2.4 Acres. Assuming an average depth of 10 feet at spillway level (existing average depth is only 2 - 3 feet), the storage capacity would be 24 Acre-Feet at spillway and 43 Acre-Feet at the top of the dam. The spillway crest is 23 feet above streambed with another 8 feet to the top of the dam. According to the Corps of Engineers' guidelines the dam is classified as "Small" in size by both height and storage capacity.

No design data is available.

The dam overtopped in August, 1955, but did not sustain significant damage.

A dam breach analysis was made using the Corps of Engineers' "Rule of Thumb" guidance for estimating downstream dam failure hydrographs. Assuming failure occurred with the water level at the top of the dam, the peak discharge was calculated to be about 18,000 cfs. The dam breach flood was routed through the downstream reaches.

The small volume of the reservoir caused the flood peak to dissipate quickly and to approximate the before breach spillway flow when it reached Rocky Glen Dam some 3,000 feet downstream. There are no inhabitants or important highways in the valley below the dam at this time. Construction is underway for residential housing about 2,000 feet downstream from Rocky Glen Dam. Final subdivision plans are not available but construction will be above

elevation 110, which is the 100 year flood stage for the Housatonic River.

As the flood peak would have dissipated before reaching this area, the dam was classified as "Low Hazard Potential".



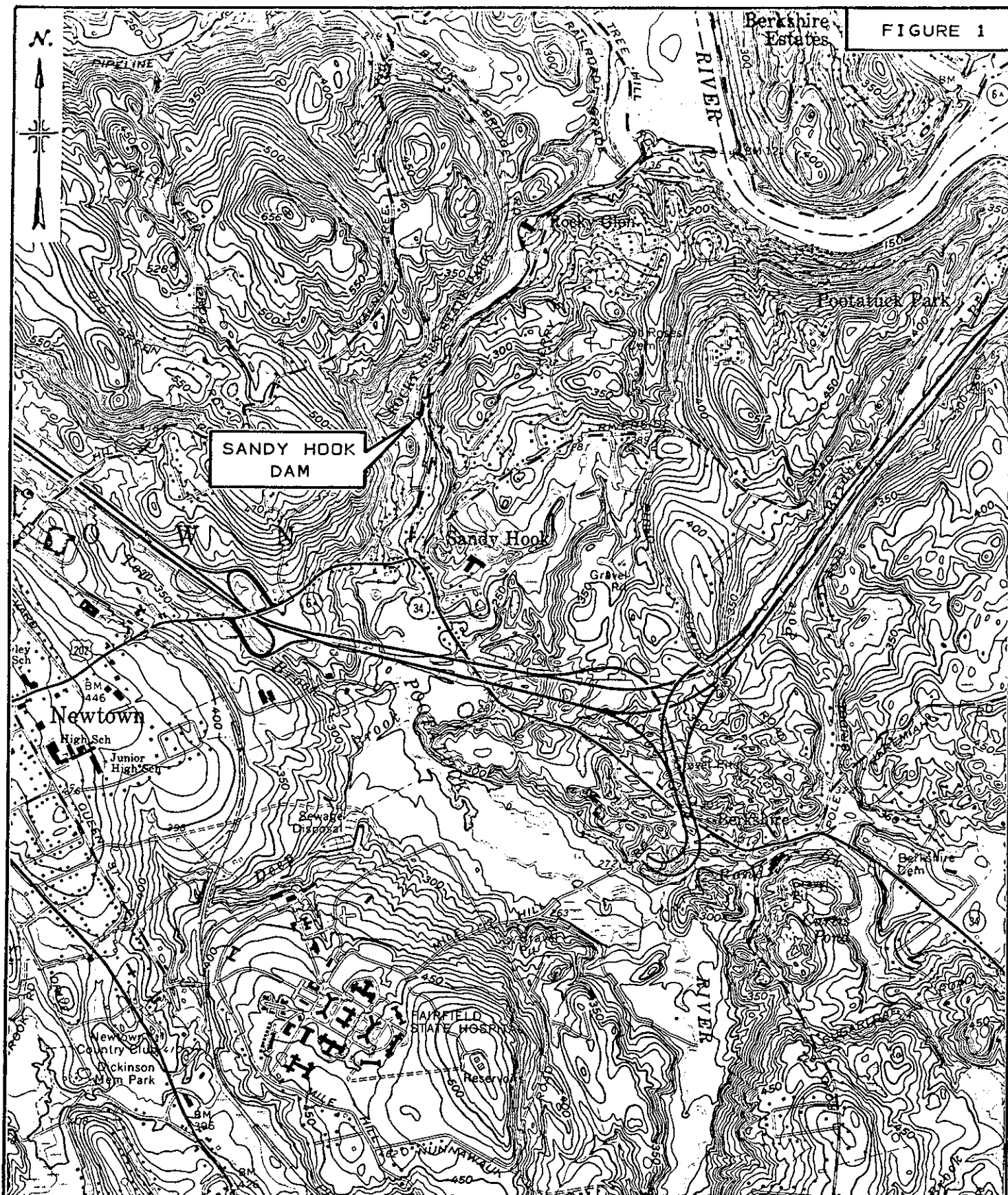
OVERVIEW PHOTO

U.S. ARMY ENGINEER DIV NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

SANDY HOOK DAM
POOTATUCK RIVER
NEWTOWN, CONNECTICUT
CT 00311
12 DEC '79



LOCATION PLAN

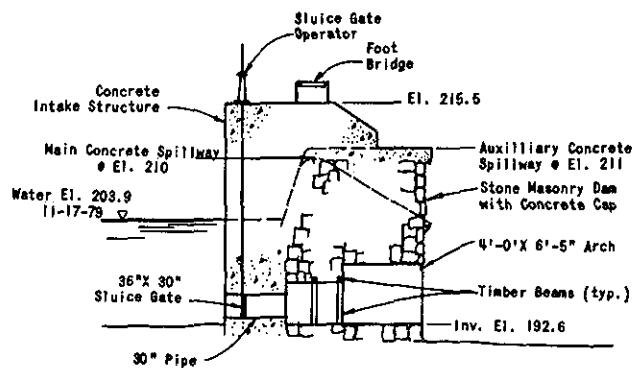
SANDY HOOK DAM
NEWTON, CONNECTICUT

SCALE: 1" = 2000'

ROALD HAESTAD, INC.

NEWTON QUADRANGLE 1972

APPENDIX A
ENGINEERING DATA



SECTION A-A

Scale 1"=20'

Note: Spillway Elevation
estimated from
USGS Quadrangle.

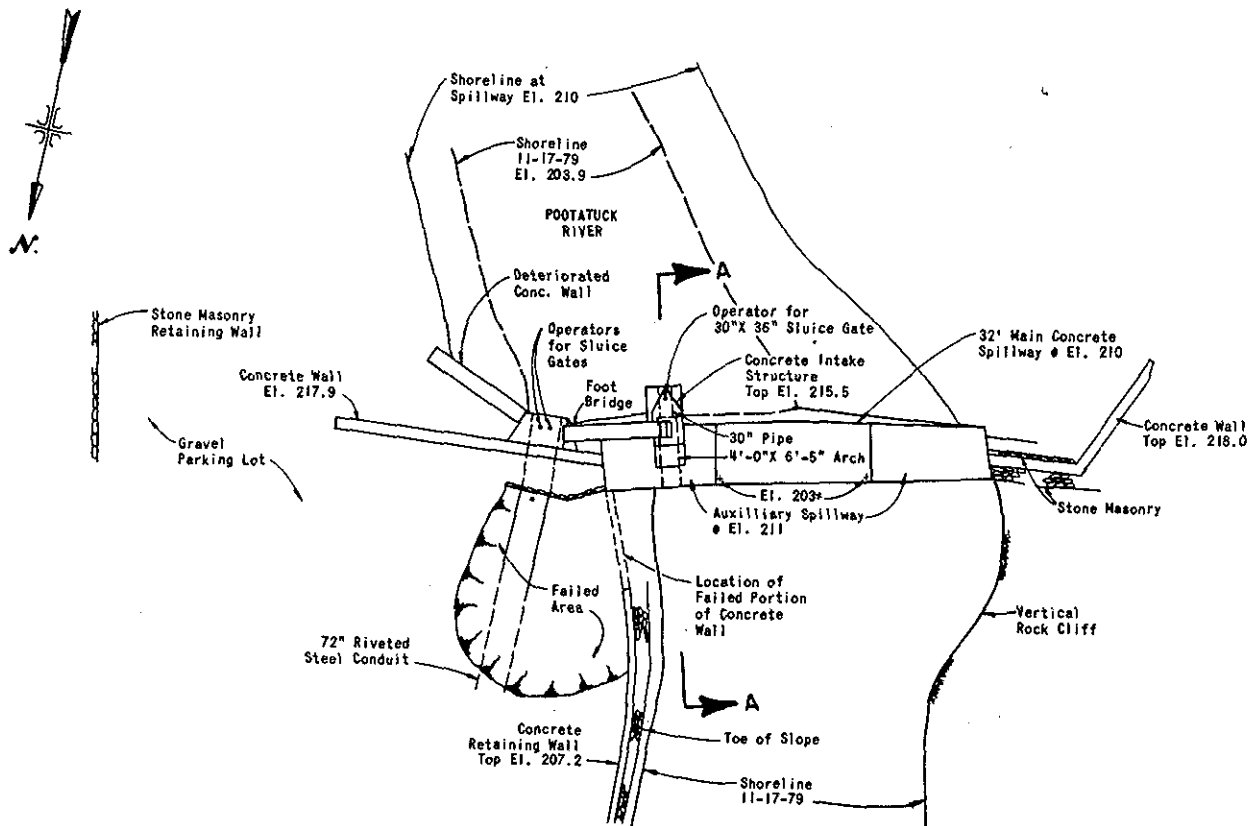
ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

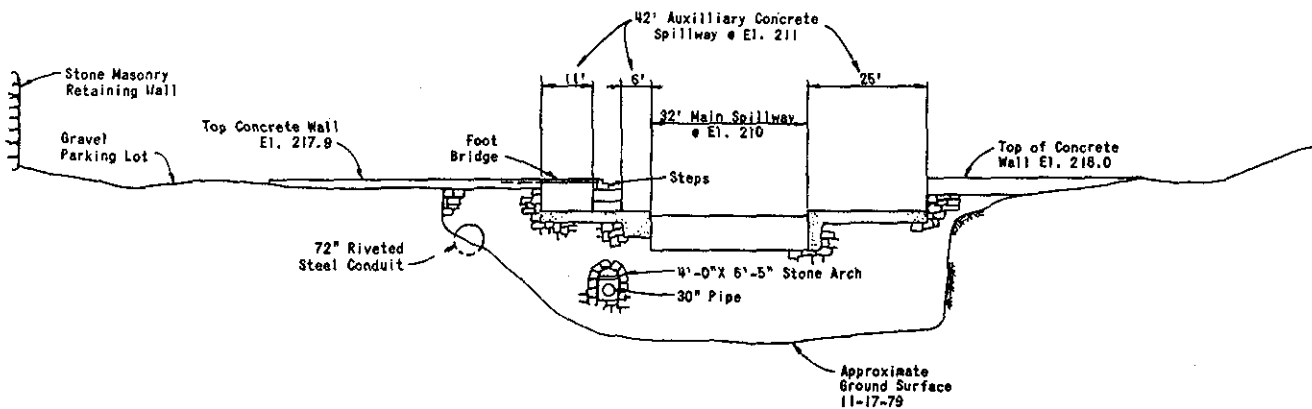
SANDY HOOK DAM

DRAWN	CHECKED	APPROVED	SCALES AS NOTED
JRS	DLS		DATE DEC. 1979 PAGE 8-1



PLAN

Scale 1"=40'

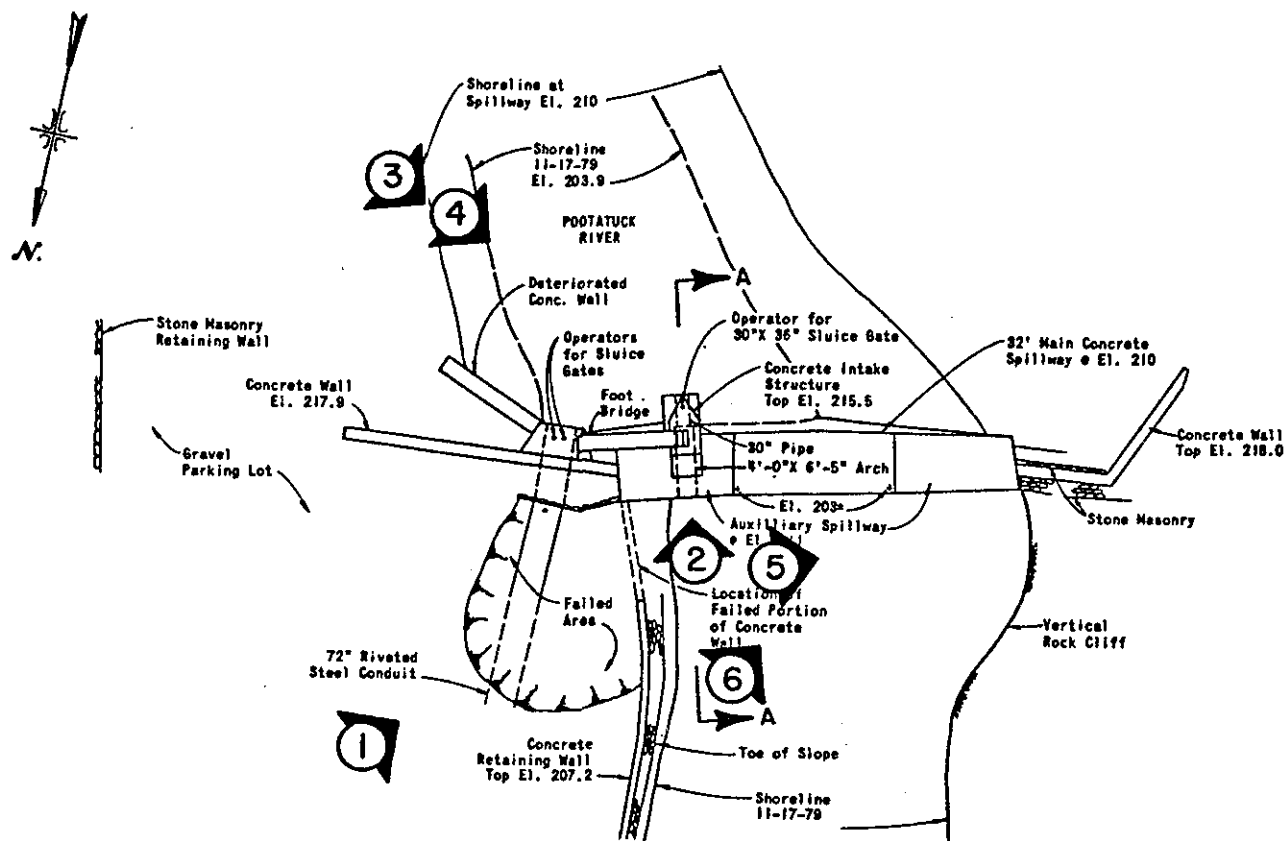


ELEVATION

Scale 1"=40'

APPENDIX B

PHOTOGRAPHS



DENOTES PHOTO NUMBER
AND DIRECTION IN WHICH
PHOTO WAS TAKEN

PHOTO LOCATION PLAN

SANDY HOOK DAM
NEWTOWN, CONNECTICUT

SCALE: 1" = 40'

APPENDIX C
HYDROLOGIC COMPUTATIONS

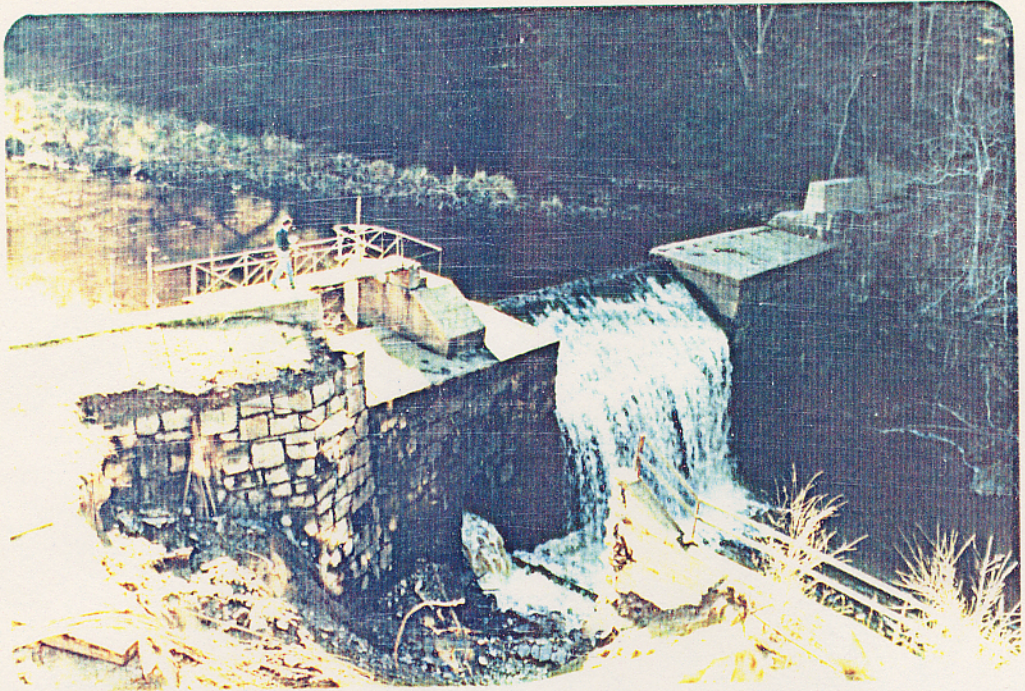


PHOTO NO. 1

OVERVIEW OF DAM FROM DOWNSTREAM SIDE



PHOTO NO. 2

STONES MISSING IN ARCH ROOF,
BLOCK POPPING OUT LEFT OF OUTLET
WOODEN MEMBERS SUPPORTING UPSTREAM ROOF

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

SANDY HOOK DAM
POOTATUCK RIVER
NEWTOWN, CONNECTICUT

CT 00311
27 NOV '79



PHOTO NOS. 3 & 4

UPSTREAM FACE AND INTAKE

U S ARMY ENGINEER DIV NEW ENGLAND

CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

SANDY HOOK DAM
POOTATUCK RIVER
NEWTOWN, CONNECTICUT

CT 00311

19 NOV '79



PHOTO NO. 5

TREE GROWING FROM STONE
MASONRY ON LEFT SIDE OF DAM



PHOTO NO. 6

DETERIORATED
CONCRETE ON
SPILLWAY SLAB

U.S. ARMY ENGINEER DIV NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

SANDY HOOK DAM
POOTATUCK RIVER
NEWTOWN, CONNECTICUT
CT 00311
27 NOV '79

BY D.L.S. DATE 12/2/79 **ROALD HAESTAD, INC.** SHEET NO. 1 OF 5
CONSULTING ENGINEERS
CKD BY S.L. DATE 12/31/79 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 049-06
SUBJECT SANDY HOOK DAM - SPILLWAY CAPACITY

	<u>Elev.</u>	<u>Length</u>	<u>Coef.</u>
MAIN SPILLWAY	210	32'	3.7
AUXILIARY SPILLWAY	211	42'	2.7
OVER BANK	218	160'	2.7

<u>DEPTH</u>	<u>MAIN SPILLWAY</u>	<u>AUXILIARY SPILLWAY</u>	<u>OVER BANK</u>	<u>TOTAL</u>
1	118	0	0	118
2	335	113	0	448
3	615	321	0	936
4	947	589	0	1536
5	1324	907	0	2231
6	1740	1268	0	3008
7	2193	1667	0	3860
8	2679	2100	0	4779
9	3197	2565	432	6194
10	3744	3062	1222	8028
11	4320	3586	2245	10,151
12	4922	4137	3456	12,515

BY...D.L.S.... DATE .12-2-75..

ROALD HAESTAD, INC.

SHEET NO. 2 OF 5

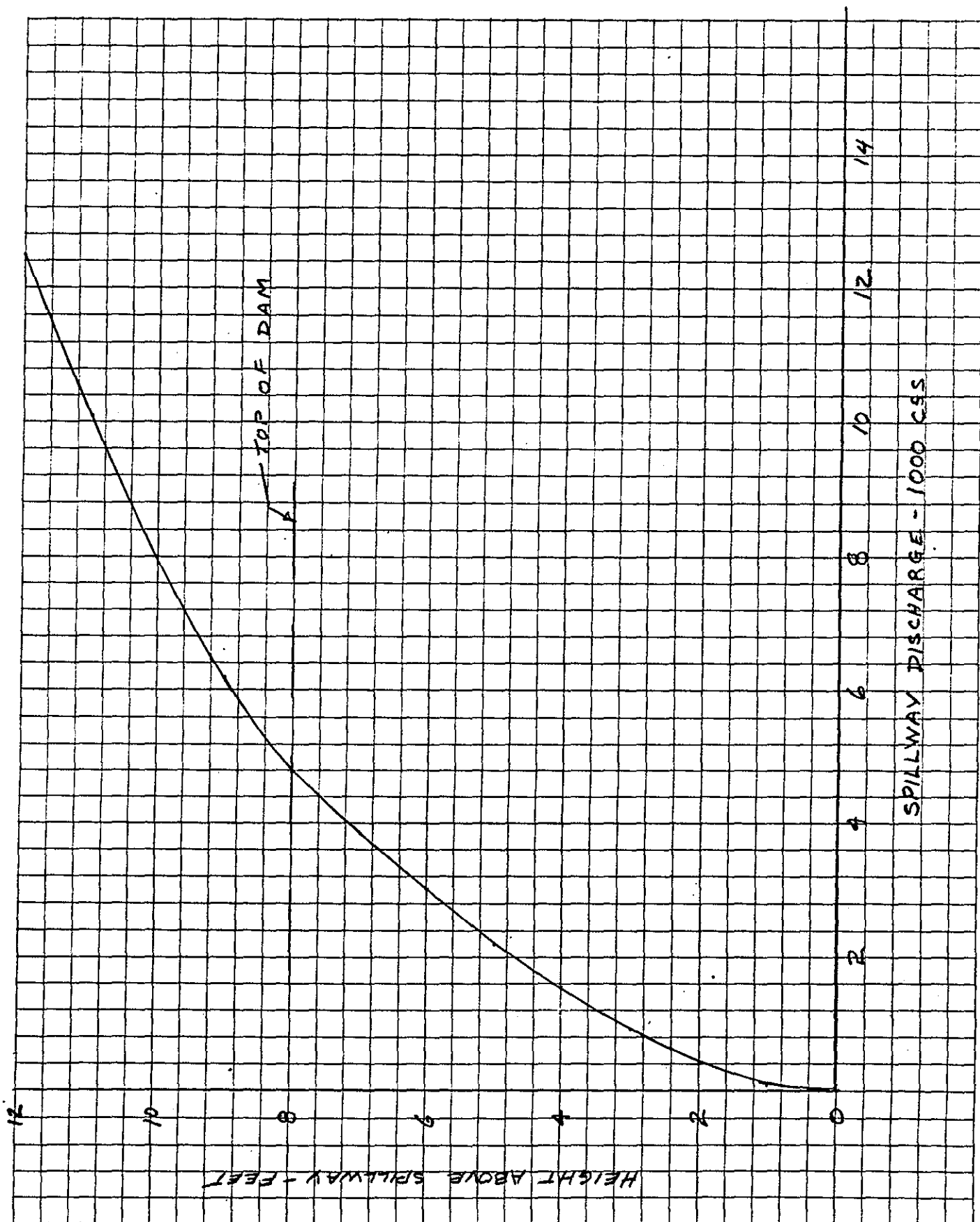
CONSULTING ENGINEERS

CKD BY...S.L. DATE .12/21/79

37 Brookside Road - Waterbury, Conn. 06708

JOB NO. 049-06

SUBJECT ...SANDY...HOOK DAM-...SPILLWAY...CAPACITY.....



BY DLS DATE 12-6-79

ROALD HAESTAD, INC.

SHEET NO. 3 OF 5

CONSULTING ENGINEERS

CKD BY SL DATE 12/31/79

37 Brookside Road - Waterbury, Conn. 06708

JOB NO. 049-06

SUBJECT SANDY HOOK DAM

WATERSHED - 24.8 sq. mi.

WATERSURFACE AREA - 2.4 ACRES

STORAGE CAPACITY - ASSUME AVE. DEPTH = 10'

STORAGE AT SPILLWAY CREST = 24 ACRE FEET

STORAGE AT TOP OF DAM = $18 \times 24 = 43$ AC. FT.

DAM FAILURE PEAK DISCHARGE

$$Q_{p1} = \frac{8}{27} W_b \sqrt{g} Y_0^{3/2}$$

$$W_b = \text{breach width} = 40\% \text{ of width at mid height} \\ = 0.4 (132') = 52.8'$$

 $Y_0 = \text{Hydraulic Height of Dam, stream bed to Abutment}$

$$Y_0 = 35'$$

$$Q_{p1} = \frac{8}{27} (52.8) \sqrt{32.2} (35')^{3/2} = 18,400 \text{ CFS}$$

SECTION 1

(SEE FIGURE 4)

$$H_1 = 20' \quad A_1 = 1000 \text{ m}^2$$

REACH LENGTH = 800'

$$V_1 = 1000 \times 800 / 43560 = 18.5 \text{ AC-FT.}$$

$$Q_{p2} = 18,400 \left(1 - \frac{18.5}{43}\right) = 10,500 \text{ CFS}$$

$$H_{2 \text{ TRIAL}} = 13.5' \quad A_{2 \text{ TRIAL}} = 660 \text{ m}^2$$

$$V_{2 \text{ TRIAL}} = 660 \times 800 / 43560 = 12 \text{ AC-FT.}$$

$$V_{\text{AVE}} = \frac{18.5 + 12}{2} = 15 \text{ AC-FT.}$$

$$Q_{p2} = 18,400 \left(1 - \frac{15}{43}\right) = 12,000 \text{ CFS}$$

$$H_2 = 15'$$

BY D.L.S. DATE 12-6-79

ROALD HAESTAD, INC.

SHEET NO. 4 OF 5

CONSULTING ENGINEERS

CKD BY S.L. DATE 12/31/79

37 Brookside Road - Waterbury, Conn. 06708

JOB NO. 049-06SUBJECT SANDY HOOK DAM - FLOOD ROUTINGSECTION 2

REACH LENGTH = 800'

$$Q_{p2} = 12,000 \text{ cfs}$$

$$H_2 = 15' \quad A_2 = 750^{\text{sq}}$$

$$V_2 = 750 \times 800 / 43560 = 1.4 \text{ AC-FT.}$$

$$Q_{p3 \text{ TRIAL}} = 12,000 \left(1 - \frac{13}{43}\right) = 8000 \text{ cfs}$$

$$H_3 \text{ TRIAL} = 11' \quad A_3 \text{ TRIAL} = 550^{\text{sq}}$$

$$V_3 \text{ TRIAL} = 800 \times 550 / 43560 = 1.0 \text{ AC-FT.}$$

$$V_{\text{AVE.}} = \frac{1.4 + 1.0}{2} = 1.2 \text{ AC-FT.}$$

$$Q_{p3} = 12,000 \left(1 - \frac{12}{43}\right) = 8650 \text{ cfs}$$

SECTION 3 (ROCKY GLEN DAM)

$$Q_{p3} = 8650 \text{ cfs}$$

$$H_3 = 7.4' \quad A_1 = 990^{\text{sq}}$$

$$V_3 = 3.8 \text{ Acres} \times 7.4 \text{ ft.} = 28 \text{ AC-FT.}$$

28 AC-FT. is greater than $\frac{1}{2} S$, Try smaller H

$$\text{Try } H_3 = 5' \quad Q_5 = 4500 \text{ cfs (From spillway curve)}$$

$$V_3 = 5' \times 3.8 \text{ Acres} = 19 \text{ AC-FT.}$$

$$Q_{p4 \text{ TRIAL}} = 8650 \left(1 - \frac{19}{43}\right) = 4900 \text{ cfs}$$

SANDY HOOK SPILLWAY CAPACITY AT FAILURE = 4800 cfs

BY.....S.L.....DATE 12/6/79...

ROALD HAESTAD, INC.
CONSULTING ENGINEERS

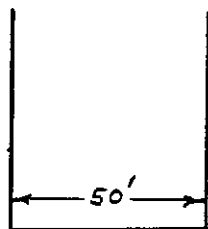
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CKD BY D.L.S. DATE 12/30/79..

37 Brookside Road - Waterbury, Conn. 06708

JOB NO.....049-06.....

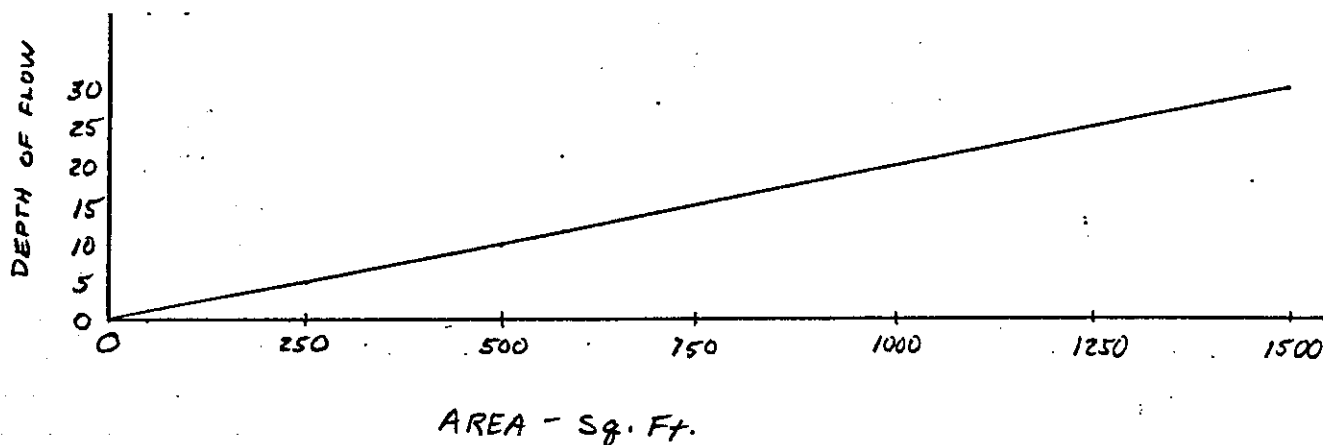
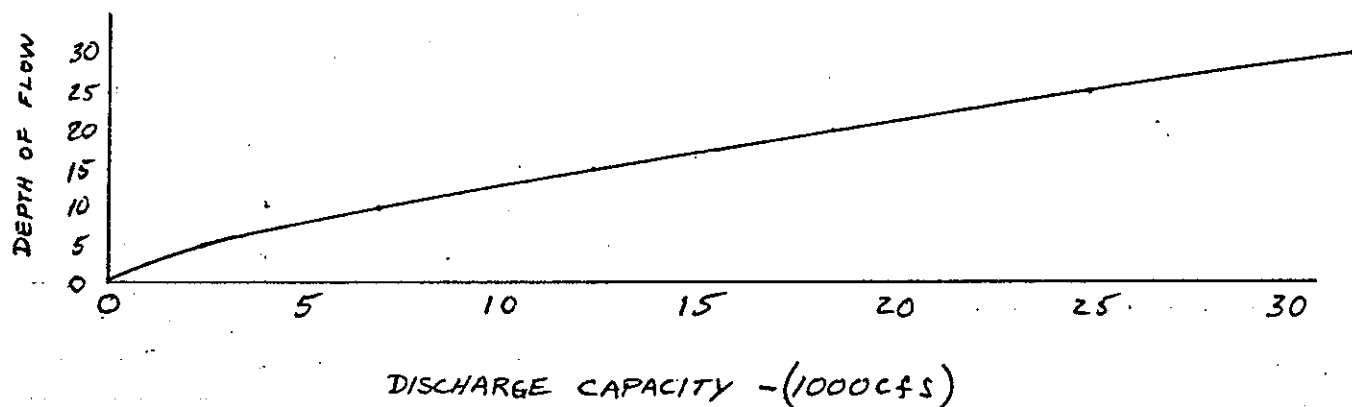
SUBJECT.....SANDY HOOK DAM - FLOOD ROUTING.....

SECTIONS 1 & 2 (SEE FIGURE 4)ASSUME VERTICAL SIDED GORGE
50' WIDE ON THE BOTTOM

$S = 0.010$

$n = 0.04$

<u>D</u>	<u>Wp</u>	<u>A</u>	<u>R</u>	<u>S</u>	<u>V</u>	<u>Q</u>
5	60	250	4.17	0.010	9.6	2400
10	70	500	7.14	0.010	13.8	6900
15	80	750	9.38	0.010	16.5	12,375
20	90	1000	11.11	0.010	18.5	18,500
25	100	1250	12.50	0.010	20.0	25,000
30	110	1500	13.64	0.010	21.2	31,800





APPENDIX D
INVENTORY FORMS

**CONNECTICUT RIVER BASIN
SUFFIELD, CONNECTICUT**

**SCHWARTZ POND DAM
CT 00280**

**PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM**

The original hardcopy version of this report
contains color photographs and/or drawings.
For additional information on this report
please email



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**DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154**

APRIL 1981

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00280	2. GOVT ACCESSION NO. ADA 144407	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Schwartz Pond Dam		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE April 1981
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		13. NUMBER OF PAGES 55
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Connecticut River Basin Suffield, Connecticut		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Schwartz Pond Dam is a masonry and concrete structure approximately 128 ft. long, with a top width of 2 ft. and a maximum height of 16 ft. Based on visual inspection, the Schwartz Pond Dam is judged to be in fair condition. As per the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the Schwartz Pond Dam is classified as 'small' in size with 'low' hazard potential. A test flood equal to 100-year frequency event was selected in accordance with the Corps of Engineers.		

SCHWARTZ POND DAM

CT 00280

CONNECTICUT RIVER BASIN

SUFFIELD, CONNECTICUT

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

DAM INSPECTION PROGRAM
FORM I INSPECTION REPORT

IDENTIFICATION NO: CT-00280
NAME OF DAM: Schwartz Pond Dam
TOWN: Suffield
COUNTY AND STATE: Hartford County, Connecticut
STREAM: Stony Brook, a tributary of Connecticut River
DATE OF INSPECTION: December 17, 1980

BRIEF ASSESSMENT

The Schwartz Pond Dam is a masonry and concrete structure approximately 128 ft. long, with a top width of 2 ft. and a maximum height of 16 ft.

There is a 3'x4' regulating outlet controlled by a sluice gate which is currently inoperable. The spillway, an overflow portion of the dam, is 86 ft. long with its crest 5.2 ft. below the top of the dam.

Based on visual inspection, the Schwartz Pond Dam is judged to be in fair condition. A feature found existing that could affect the stability of the dam is the deteriorating concrete at the wingwalls, regulating outlet and west dam embankment.

It is recommended that the owner arrange for a qualified registered engineer to do the following within one year of receipt of this report:

Inspect and evaluate the condition of concrete and masonry within the dam and appurtenant structures, and the contact zone between them and the ledge rock foundation. The pond should be lowered in order to enable a thorough inspection;

Determine the origin and significance of seepage under the sandstone wall at the east side of the dam.

It is recommended that the owner repair the wooden sluice gate and the winch mechanism of the regulating outlet within one year of receipt of this report. Other remedial measures contained in Section 7 should also be carried out within a period of one year.

As per the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the Schwartz Pond Dam is classified as 'small' in size with 'low' hazard potential. A test flood equal to 100-year frequency event was selected in accordance with the Corps of Engineers' Guidelines. The calculated test flood inflow of 9,500 cfs results in a routed outflow of 9,400 cfs. The spillway capacity is 3,300 cfs with water level at the top of the dam. The spillway is capable of passing 35% of the routed test flood outflow. The storage capacity of the pond up to the top of the dam is 150 ac. ft. and up to the test flood level is 190 ac. ft.

An operation and maintenance manual to take care of normal routine procedures should be prepared.

GOODKIND & O'DEA INC.
AND
SINGHAL ASSOCIATES
(J.V.)

RAMESH SINGHAL, Ph.D., P.E.
(Singhal Associates)

LAWRENCE J. BUCKLEY, P.E.
(Goodkind & O'Dea Inc.)

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the

present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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SECTION

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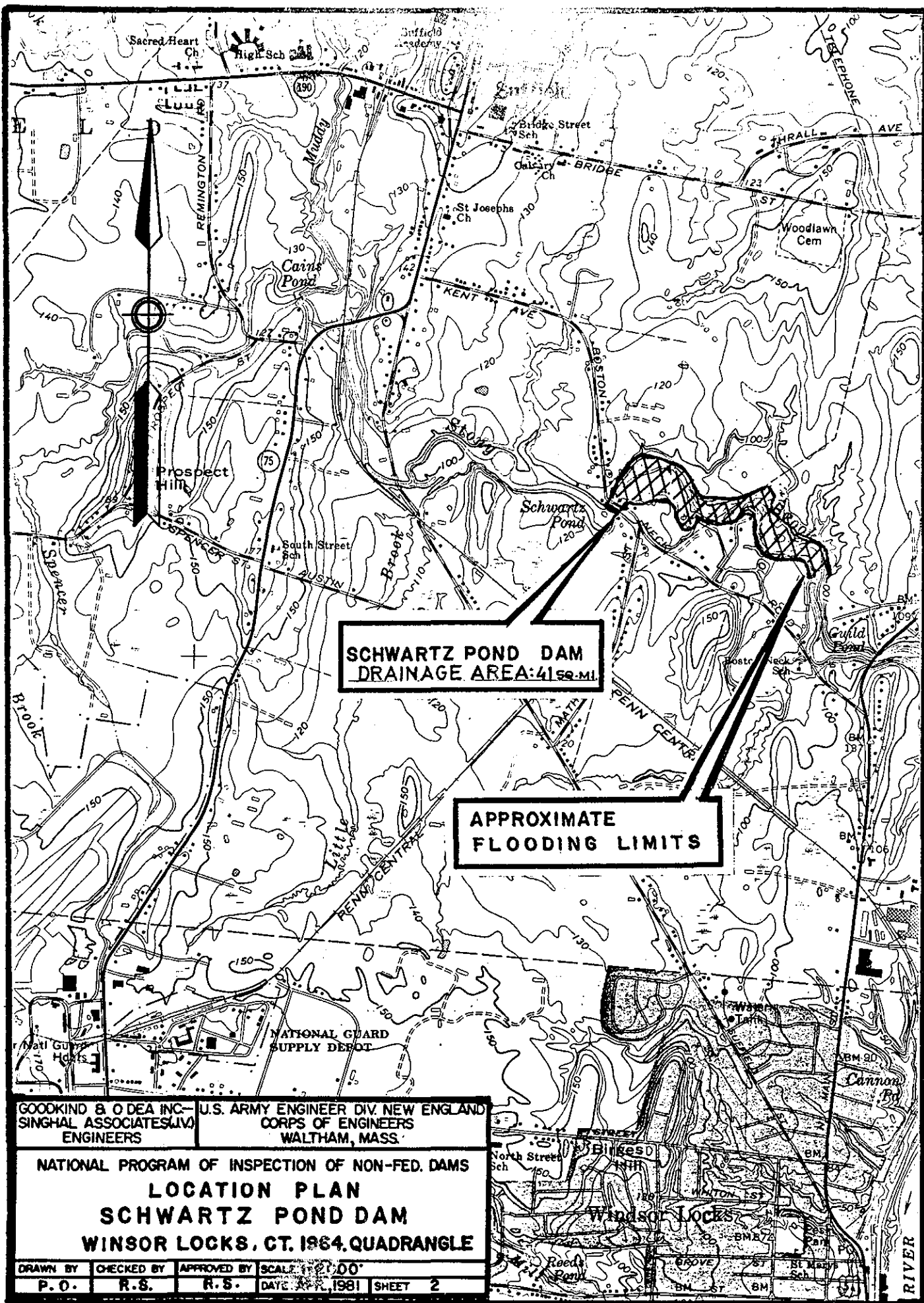
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GOODKIND & O'DEA INC.- SINGHAL ASSOCIATES (IV) ENGINEERS		U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS OVERVIEW PHOTO OF DAM SCHWARTZ POND DAM SUFFIELD, CONNECTICUT			
DRAWN BY	CHECKED BY	APPROVED BY	SCALE: NONE
E.T.K.	W.J.W.	L.J.B.	DATE: APR., 1981 SHEET 1



NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

PROJECT INFORMATION
Section 1

1.1 GENERAL

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Goodkind & O'Dea Inc., Hamden, Conn. and Singhal Associates, Orange, Connecticut (Joint Venture) have been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Goodkind & O'Dea Inc. and Singhal Associates (J.V.) under a letter of December 9, 1980 from Colonel William E. Hodgson, Jr., Corps of Engineers. Contract No. DACW 33-81-C-0022 dated December 9, 1980 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

The purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions requiring

The east concrete dam embankment and the 45 ft. concrete retaining wall were generally in good condition, with no evidence of any cracking or spalling. Extending from the east dam embankment, the concrete wingwall was in poor condition as shown in Photo 4. The lower north corner of the wingwall is broken and the concrete is moderately spalled with additional deterioration at the junction of the outlet works and wingwall.

Seepage was observed under the sandstone wall, east of the spillway, as noted on the general dam plan in Appendix B. The seepage flowed steadily, but was small and appeared to be free of any soil particles. A 12 ft. portion of this sandstone wall, which is abutting the stone slope, was also observed to be tilting forward (See general dam plan in Appendix B).

As shown in Photo 5, the concrete wingwall west of the spillway was in fair condition with no visible cracks. The bottom portion of the wingwall appeared to have been recently repaired with no apparent voids underneath; however, the north end of the wingwall did show signs of continuing deterioration (See Photo 7). At the junction of this wingwall and the west concrete dam embankment, moderate deterioration was observed as shown in Photo 6. Some efflorescence was also noted at the construction joints of the west dam embankment as shown on the general dam plan in Appendix B. The area

immediately downstream of this embankment was void of fill and at much lower elevation than the bottom of the pond (See Photo 7).

It appears that the entire dam, including the spillway, is founded on rock base. The contact zone between the rock and the bottom of the concrete structures and the structures themselves could not be inspected due to the full pool with the water flowing over the spillway.

c. Appurtenant Structures

Spillway

The concrete spillway was generally in good condition as shown in Photos 2 and 3. Exposed coarse aggregate along the spillway and two minor cracks on the crest were observed as noted on the general dam plan in Appendix B. Any seepage that may flow through or under the spillway could not be inspected due to the water flowing over the spillway.

Schwartz Pond, which serves as the upstream channel to the spillway, was in good condition with no accumulation of debris. A small island with a few overhanging trees was the only spillway obstruction noted (See Photo 2).

The channel immediately downstream of the spillway was also in good condition. The floor of the downstream channel was rocky and clean, with a few overhanging trees.

Regulating Outlet

The only regulating outlet for the dam is a 3' x 4' sluice through the east end of the dam with an invert approximately 7' below the spillway crest and 3' above the discharge

channel. A wooden sluice gate is located at the entrance of the outlet and controlled by an iron winch, which is situated on top of the eastern dam embankment (See Photo 3).

The 3' x 4' outlet was in poor condition with moderate deterioration of the concrete around the outlet opening. A scour pocket, approximately 2' deep was noted immediately beyond the outlet in the rock ledge. In the closed position and leaking an appreciable amount of water, the wooden sluice gate is not connected to the iron winch and, therefore, inoperative.

d. Reservoir Area (Schwartz Pond)

The reservoir is located in a partially developed, wooded area with numerous trees overhanging the shore. The few residential homes in close proximity to the pond are situated on high ground.

e. Downstream Channel (Stony Brook)

The channel downstream of the dam is a natural rocky bottom brook with several ledge outcrops along the downstream route. The general condition of the channel is very good with no accumulation of debris. Located approximately 120' downstream of the dam is a masonry and concrete bridge with a 24" cast iron sewer pipe hanging from the structure (See Photo 8).

3.2 Evaluation

The general condition of Schwartz Pond Dam is fair, as assessed by the visual inspection. The following features could influence the future condition and/or stability of the dam:

1. Additional deterioration of the concrete wingwall east of the spillway may greatly increase the possibility of failure of the east concrete dam embankment.
2. Further deterioration of the concrete regulating outlet and the wooden sluice gate could result in increased leakage which may promote further deterioration of the east wingwall.
3. Additional deterioration of the west concrete dam embankment at the junction of the west wingwall will increase the possibility of the failure of these structures.
4. The inoperative condition of the wooden sluice gate at the regulating outlet prevents the lowering of the pool which is required to properly inspect the dam embankment and spillway.

OPERATIONAL AND MAINTENANCE PROCEDURES
Section 4

4.1 Operational Procedures

a. General

At this time, there are no operational procedures, such as dam surveillance or reservoir level readings. The concrete spillway was designed to be uncontrolled and, therefore, would not require any operational procedures.

The regulating outlet located on the east side of the dam is presently inoperative. When the outlet mechanism was working, the wooden sluice gate normally would have remained closed. The sluice gate was last opened during the Spring of 1980 when the 24" sewer pipe was built under Stoney Brook upstream of the dam.

b. Description of any Warning Systems in Effect

There are no warning systems in effect.

4.2 Maintenance Procedures

a. General

Schwartz Pond Dam is maintained by Mitchell Bryll, the owner. The maintenance procedures, which are very informal, primarily consist of the routine removal of logs and debris from the upstream and downstream channels of the spillway.

b. Operating Facilities

At this time, there are no maintenance procedures for the regulating outlet which is presently inoperative.

4.3 Evaluation

The operational and maintenance procedures of Schwartz Pond Dam are poor. The present condition of the dam substantiates the need for formal operational and maintenance procedures with continuing records, which should be developed by the owner. A list of recommended procedures for the operation and maintenance of the dam is given in Section 7.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

Section 5

5.1 GENERAL

The pond has a contributory watershed area of 41 square miles which is practically flat with average slope under 1%. A good part of this area is built up and inhabited, with several town and State roads passing through it.

The Schwartz Pond Dam is a masonry and concrete structure with a maximum height of 16 ft. It has an inoperable 3'x4' low level outlet with an invert approximately 7 ft. below the spillway crest. An 86 ft. length of the dam with crest elevation 96.1 acts as overflow spillway section. Crest elevation of rest of dam is 101.3 which is 5.2' higher than the crest elevation of the spillway. The spillway capacity is 3,300 cfs before overtopping of the dam occurs. The spillway capacity at the routed test flood elevation of 103.6 is 9,400 at which stage the dam is overtopped by 2.3 ft.

5.2 DESIGN DATA

No records are available concerning design data.

5.3 EXPERIENCE DATA

There are no records of pond levels or extent of any overtoppings of the dam.

5.4 TEST FLOOD ANALYSIS

Based on dam failure analysis and impact from test flood, the Schwartz Pond Dam is classified as 'Low' hazard potential

in accordance with Table 2 on page D-9 of the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams. The dam being 'small' in size and with 'low' hazard potential, the test flood was taken to be equal to the 100-year frequency flood.

The 100-year frequency flood for 41 square miles contributory drainage area, came out as 9,500 cfs using the Connecticut Flood Flow Formula:

$$Q \text{ mean} = 0.85 AS = 0.85 \times 41 \times 53 = 1,850 \text{ cfs}$$

$$\text{and } Q_{100} = 5 \times Q \text{ mean} = 5 \times 1850 = 9,300 \text{ cfs (say 9,500 cfs)}$$

The routed flow worked out as 9,400 cfs. The spillway capacity up to the top of the dam is 3,300 cfs which is only 35% of the routed test flood.

5.5 DAM FAILURE ANALYSIS

A dam failure analysis was made using the guidelines provided by the Corps of Engineers. Failure of the dam was assumed with water level at the top of the dam elevation 101.3. A 50 ft. wide and 16 ft. high breach resulted in a peak release rate of 5,400 cfs which is less than the routed test flood of 9,400 cfs. The dam failure will therefore produce less hazardous conditions than the test flood flow if the dam does not fail.

The height of the flood wave came out approximately 9 ft. at the first cross-section (Station 5+0). Two additional cross-sections at 2,700 ft. and 5,000 ft. downstream from the dam were also analyzed. Computations are included in Appendix D. There

correction in a timely manner by non-federal inspectors.

2. Encourage and prepare the States to quickly initiate effective dam inspection programs for non-federal dams.
3. To update, verify and complete the National Inventory of dams.

1.2 DESCRIPTION OF PROJECT

The Schwartz Pond Dam is located on Stony Brook, which flows into the Connecticut River approximately $1\frac{1}{2}$ miles downstream from the dam. The location is approximately $1\frac{1}{2}$ miles south from Suffield Town Hall and 1 mile southeast of the intersection of Route 75 and Suffield Street. The geographic location of the site may be found on the Windsor Locks Quadrangle Map, with coordinates of latitude N $41^{\circ} 57.8'$ and longitude W $72^{\circ} 38.3'$.

The Schwartz Pond is impounded by a masonry and concrete dam approximately 128 ft. long out of which an 86 ft. length is the spillway section. The dam embankment extends 15 ft. east and 26 ft. west of the spillway. In addition, there are two concrete wingwalls and a 45 ft. concrete retaining wall as shown on the general dam plan in Appendix B. The top width of the dam is 2 ft. and height approximately 16 ft. The crest elevation of the spillway and the dam are 96.1 and 101.3 respectively, the freeboard being approximately 5.2 ft. The only regulating outlet for the dam is a 3'x4' opening through the east end of the dam with its invert approximately 7 ft. below the spillway crest and 3 ft. above the discharge channel. A wooden sluice

gate is located at the entrance of the outlet, controlled by an iron winch which is located on the eastern dam embankment (see photo 3).

The dam is classified as 'Small' as the height is 16 ft. and storage up to the top of the dam is only 150 ac. ft.

Hazard classification is 'low'. Dam failure analysis shows a peak release rate of only 5,400 cfs as against the test flood flow of 9,500 cfs which too does not cause any downstream hazard due to the high and steeply sloping banks of the Stony Brook.

The Schwartz Pond Dam is owned by:

Mitchell and Asunda Bryll
537 Boston Neck Road
Suffield, Conn. 06078
Telephone: (203) 668-2465

The purpose of the dam is recreational. There are no known records of any construction or post-construction changes. Unconfirmed reports say that originally the dam and spillway consisted of stone masonry and were utilized by mills located on each bank. In the 1920's, the masonry structure was supposedly overlaid with concrete. There was some damage to the structures during 1955 flood after which some repairs were done.

Currently there are no operational procedures like dam surveillance or recording of reservoir levels. The concrete

spillway needs no operational procedures. The 3'x4' regulating outlet located on the east side of the dam is inoperable.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area consists of 41 square miles of flat terrain with an average slope under 1%. Elevations in the basin range from about 100 to 600 ft. MSL. A good part of the area is built up and inhabited with several town and State roads passing through it.

b. Discharge at Damsite

There is only one spillway facility 86 ft. wide located in the middle of the dam, with a crest elevation of 96.1.

1. Outlet works	N/A
2. Maximum known flood at damsite	Unknown
3. Ungated spillway capacity at top of dam:	3,300 cfs
Elevation:	101.3
4. Ungated spillway capacity at test flood:	9,400
Elevation:	103.6
5. Total project discharge at top of dam:	3,300 cfs
Elevation:	101.3
6. Total project discharge at test flood:	9,400 cfs
Elevation:	103.6

c. Elevation - (NGVD)

1. Stream bed at toe of dam:	85.3
2. Bottom of cutoff:	N/A
3. Maximum tailwater:	N/A

4. Normal pool:	96.2
5. Full flood control pool:	96.1
6. Spillway crest:	96.1
7. Design surcharge:	N/A
8. Top of dam:	101.3
9. Test flood surcharge:	103.6

d. Reservoir - Length in Feet

1. Normal pool:	2,000 ft.
2. Flood control pool:	2,000 ft.
3. Spillway crest pool:	2,000 ft.
4. Top of dam:	3,000 ft.
5. Test flood pool:	3,200 ft.

e. Storage - Acre Feet

1. Normal pool:	75 ac. ft.
2. Flood control pool:	75 ac. ft.
3. Spillway crest pool:	75 ac. ft.
4. Top of dam:	150 ac. ft.
5. Test flood pool:	190 ac. ft.

f. Reservoir Surface - Acres

1. Normal pool:	11.5 acres
2. Flood control pool:	11.5 acres
3. Spillway crest pool:	11.5 acres
4. Top of dam:	19.0 acres
5. Test flood pool:	21.5 acres

j. Regulating Outlets:

1. Invert: 89.0
2. Size: 3 ft. x 4 ft.
3. Description: Concrete sluice outlet
4. Control Mechanism: Wooden sluice gate located on upstream side of outlet, controlled by iron winch situated on top of east dam embankment. Sluice gate is currently inoperable.

ENGINEERING DATA
Section 2

2.1 Design Data

There is no available design data.

2.2 Construction Data

There is no available construction data.

2.3 Operational Data

There is no available operational data.

2.4 Evaluation of Data

a. Availability

There is no available engineering data.

b. Adequacy

The engineering data available is inadequate to be of any assistance in the evaluation of the performance of the dam.

c. Validity

Due to the absence of any engineering data, the validity of the data cannot be assessed.

VISUAL INSPECTION
Section 3

3.1 Findings

a. General

The formal field inspection took place December 17, 1980 by engineers from Goodkind & O'Dea, Inc., and Singhal Associates. Detailed checklists, which are included in Appendix A, were utilized for the inspection of the dam and spillway. Photographs showing the dam features and problem areas were also taken during the inspection and are given in Appendix C along with the photo location plan.

Based upon the visual inspection, the general condition of the project was 'fair' with some areas requiring repair work and/or monitoring. At the time of the inspection the pool level of Schwartz Pond was approximately 96.2 ft. (NGVD) which was one-tenth of a foot above the spillway crest elevation.

b. Dam

Schwartz Pond Dam is a masonry and concrete structure approximately 128' long consisting of a 86.3' spillway, with the dam embankment extending 15' east and 26' west of the spillway. In addition, there are two concrete wingwalls, and a 45' concrete retaining wall as shown on the general dam plan in Appendix B. The horizontal and vertical alignments of these dam features appeared good with no signs of movement or settlement as shown in Photos, 1, 2 and 3.

is no flood hazard under test flood conditions except partial flooding of one house. The dam breach flood flow being smaller than test flood will not cause additional flooding.

EVALUATION OF STRUCTURAL STABILITY
Section 6

6.1 Visual Observations

The visual inspection revealed no immediate structural stability problems at this time; however, two areas of major concern were noted.

The additional deterioration of the east wingwall would greatly diminish the structural stability of the east concrete dam embankment. Increased deterioration of this wingwall would lead to the erosion of the earth embankment on the downstream side of the dam. The deterioration of this wingwall is being accelerated by the leaky wooden sluice gate at the regulating outlet. The continuous action of the flowing water is gradually eroding the concrete from the east wingwall and outlet structure.

One area of minor concern noted was the void space downstream of the west concrete dam embankment. There is additional strain on this concrete structure due to the higher upstream pond bottom elevation.

It appears that the entire dam embankment, including the spillway, is founded on rock base. The condition of these structures at the contact zone with the rock and the structures themselves could not be inspected due to the pool level and water flow over the spillway; therefore, a visual assessment of the condition could not be made at this time.

6.2 Design and Construction Data

There is no design or construction data available; therefore, an analysis of the structural stability could not be made.

6.3 Post Construction Changes

There are no known records of any post construction changes; however, through an informal conversation with a local resident the following changes and/or repairs were made to Schwartz Pond Dam. Originally the dam and spillway consisted of stone masonry, and were utilized by mills once located on each side. In the late 1920's the masonry structure was supposedly overlaid with concrete that still exists. During the visual inspection there was no evidence of this being the case, but since the pool level and/or water flow obscured most of the structure, a final conclusion could not be made at that time. Unknown repairs were also made to dam after its being damaged by the 1955 Flood.

6.4 Seismic Stability

The dam is located in Seismic Zone 1 and in accordance with Corps of Engineers' guidelines does not warrant further seismic analysis at this time.

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES
Section 7

7.1 Project Assessment

a. Condition

Based upon the visual inspection of the site and past performance, the dam appears to be in fair condition. There was no evidence of any immediate structural instability problems; however, there are areas of concern requiring repair work and/or monitoring as noted in Sections 7.2 and 7.3.

Based upon "Preliminary Guidance for Estimating Maximum Probable Discharge" dated March, 1978, peak inflow to the lake is 9,500 cfs; peak outflow is 9,400 cfs, with the water level 2.3 feet above the dam crest. Based upon our hydraulic computations, the spillway capacity with the lake level to the top of dam is 3,300 cfs, which is equivalent to approximately 35% of the routed test flood outflow.

b. Adequacy of Information

The information available is such that an assessment of the condition and stability of the dam had to be based only on the visual inspection.

c. Urgency

It is recommended that the measures presented in Section 7.2 and 7.3 be implemented within one year of the owner's receipt of this report.

7.2 Recommendations

It is recommended that the owner employ a qualified registered engineer to:

1. Inspect and evaluate the condition of the concrete dam structures and the contact zone between the structures and rock base. The water level in the pond should be lowered so that a thorough inspection can be completed.
2. Determine the origin and significance of seepage under the sandstone wall located on the east side of the dam.

The owner should implement the recommendations of the engineer.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

The following measures should be undertaken within the time period indicated in Section 7.1.c., and continued on a regular basis.

1. A formal program of operation and maintenance procedures should be instituted and fully documented to provide accurate records for future reference.
2. Repair the wooden sluice gate and the winch mechanism of the regulating outlet.
3. Repair the areas of concrete deterioration at the east and west wingwalls, the regulating

outlet and the west dam embankment.

4. Fill in the void area immediately downstream of the west concrete dam embankment with earth.

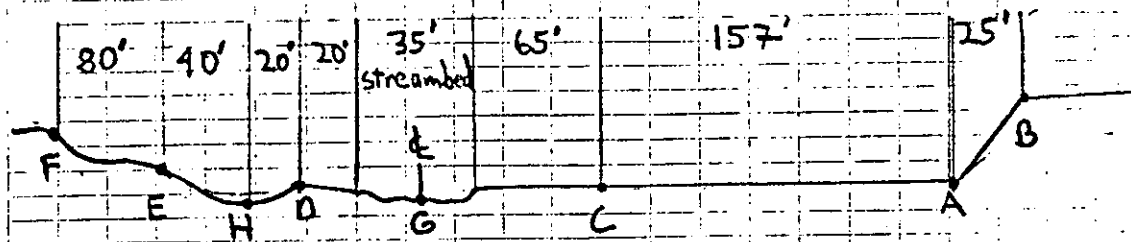
7.4 Alternatives

This study has identified no alternatives to the above recommendations.

	B.S.	H.I.	F.S.	Elev
RM-9	1.04	102.73		101.69
TP-1	.28	93.61	9.40	93.33
TP-2	10.00	95.04	8.57	85.04
TP-3	5.90	82.52	18.42	76.62
CS2-A			7.6	74.9
CS2-B			-3.1	85.9
CS2-C			9.0	73.5
CS2-D			5.0	77.5
CS2-E			4.2	78.3
CS2-F			0.0	82.5
CS2-G			11.0	71.5
CS2-H			9.0	73.5

Continued on Page 40

Sec Page 33

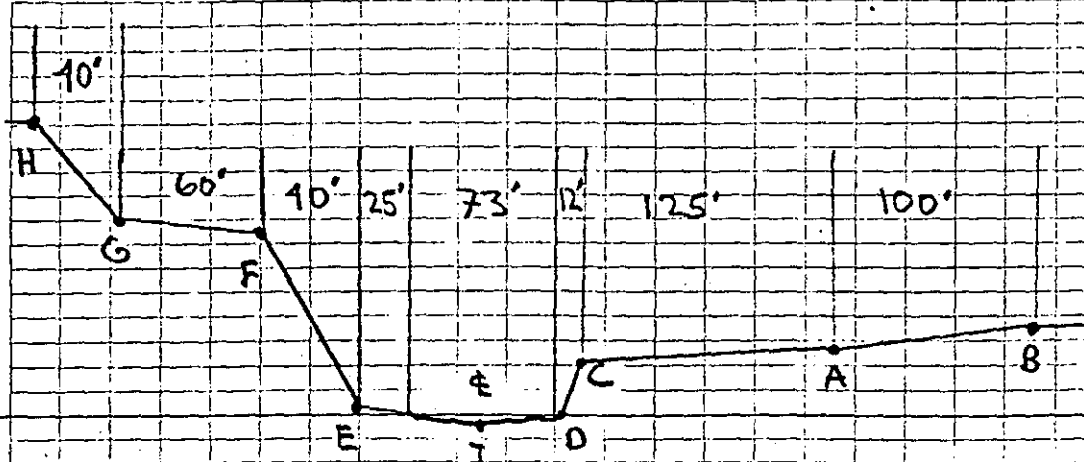


CROSS SECTION 2

STONEY BROOK
(LOOKING DOWNSTREAM)

CROSS SECTION 2
CS2

	B.S.	H.T.	F.S.	ELEV.
CONTINUED		FROM	PAGE	38
		84.52		
TP-4	20.18	94.90	7.80	74.72
TP-5	7.90	92.80	10.00	84.90
TP-6	3.49	90.05	6.24	86.56
TP-7	1.69	78.93	12.81	77.24
TP-8	2.77	77.23	4.47	74.46
CS3-A			9.1	68.1
CS3-B			2.9	74.3
CS3-C			9.3	67.9
CS3-D			17.6	59.6
TP-9	13.95	87.46	3.72	73.51
CS3-E			61±	
CS3-F			1.7	82.8
CS3-G				84±
CS3-H				96±
CS3-I				59±
TP-9	3.80	77.31		73.51
TP-10	6.77	77.29	6.79	70.52
TP-11	12.66	82.50	7.45	69.84
TP-12	2.33	76.28	8.55	73.95
MH-6			5.75	70.53



CROSS SECTION -3
 STONEY BROOK
 (LOOKING DOWNSTREAM)

TOP OF MANHOLE 5' NORTH OF
 BRIDGE DECK ROAD, FRONT OF
 MANHOLE # 872 (27015 from Survey)
 Town Hall

CROSS SECTION -3 CS3



2/23/81

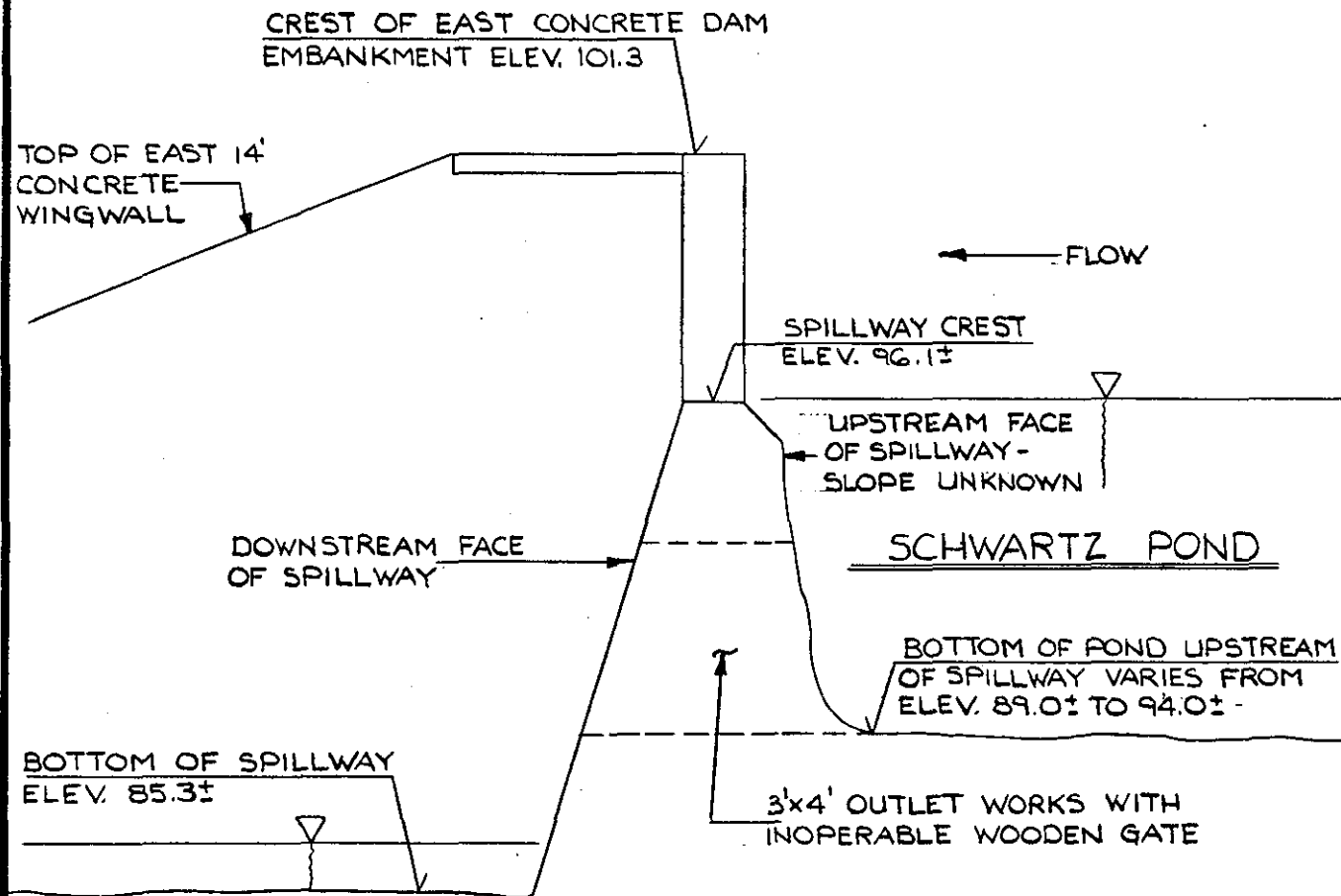
SCHWARTZ
POND DAM
3- DOWNSTREAM
CROSS
SECTIONS

Very steep $\approx 25' \text{ ft}$
Top of sl
to stream
bed

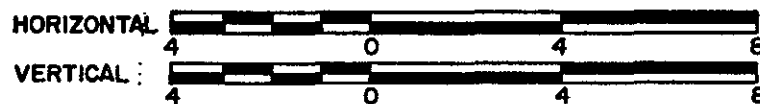
WJW π
ETK \perp

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2. Design of Small Dams, Revised Reprint, United States Department of the Interior, Bureau of Reclamation, United States Government Printing Office, Washington, D.C.
3. Soil Survey, Hartford County, Connecticut, United States Department of Agriculture, U.S. Government Printing Office, Washington, 25, D.C. 1962
4. Donald M. Gray: Handbook on the Principles of Hydrology, Water Information Center, 1970.
5. Hunter Rouse: Engineering Hydraulics, John Wiley and Sons, New York, 1950.
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PROFILE OF SPILLWAY



NOTE:

ALL ELEVATIONS REFERENCED TO NGVD.

GOODKIND & O'DEA INC.- SINGHAL ASSOCIATES/JV ENGINEERS		U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS			
PROFILE OF SPILLWAY			
SCHWARTZ POND DAM			
SUFFIELD, CONNECTICUT			
DRAWN BY E.C.K.	CHECKED BY W.L.W.	APPROVED BY L.B.	SCALE: AS NOTED DATE: APR., 1981
		SHEET 8-2	

APPENDIX C

DETAIL PHOTOGRAPHS



Photo 1 - View looking west along the
dam and spillway.



Photo 2 - View of spillway from bridge.
Note outlet works on left edge
of spillway.



Photo 3 - View looking east across spillway.



Photo 4 - View of north end of east wingwall.
Note deteriorating concrete.

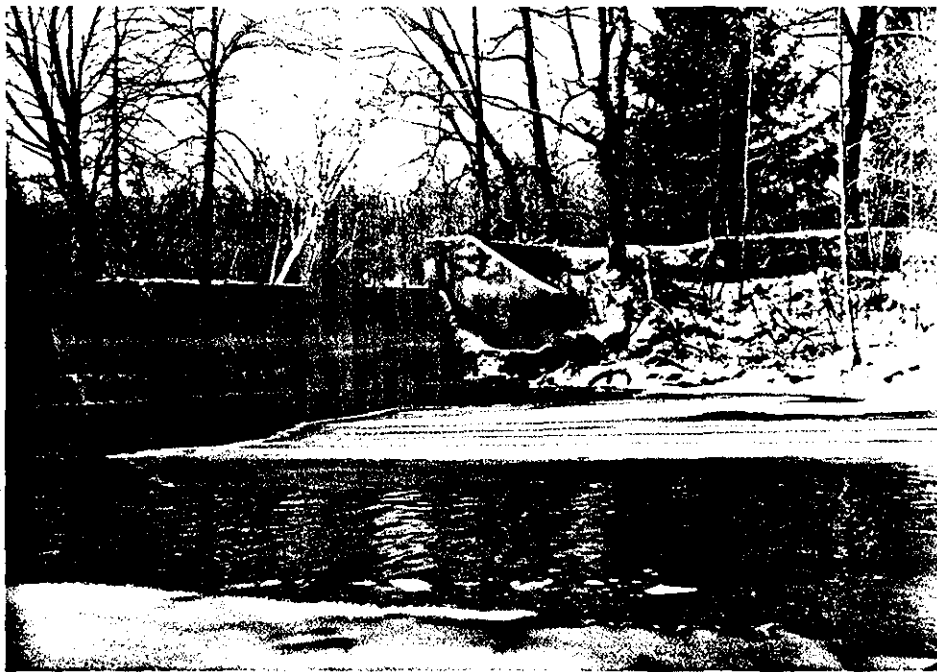


Photo 5 - View of spillway and west wingwall.



Photo 6 - View of southeast corner of west dam embankment. Note deteriorated concrete.



Photo 7 - View of northeast corner of west wingwall. Note deteriorated concrete.



Photo 8 - View of highway bridge and downstream channel (Stoney Brook). Note utility pipe suspended under bridge.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

SINGHAL ASSOCIATES

CONSULTING ENGINEERS
(CIVIL, HYDRAULICS, SANITARY)

827 MAPLEDALE ROAD, ORANGE, CT 06477
TEL: (203) 795-6562

DAM

TEST FLOOD

DRAINAGE AREA = 41.0 SQ. MILES

THE TERRAIN HAS AN AVERAGE SLOPE OF UNDER 1%.
THE DRAINAGE AREA CAN BE CLASSIFIED UNDER 'FLAT AND
COASTAL' CATEGORY.

TAKING A FACTOR OF 840 FROM THE CORPS OF
ENGINEERS' CHART,

$$\begin{aligned} \text{PMF} &= 540 \times 41 \\ &= 22,000 \text{ CFS.} \end{aligned}$$

SIZE AND HAZARD CLASSIFICATION

MAXIMUM HEIGHT OF THE DAM = 16 ft.

MAXIMUM IMPOUNDMENT UPTO TOP
OF DAM = 150 AC. FT.

SIZE OF THE DAM = "SMALL"

THE HAZARD POTENTIAL IS 'LOW'. THE DAM
BREACH COMPUTATIONS INDICATE THAT THERE IS NO
ADDITIONAL FLOODING DUE TO DAM BREACH AS
COMPARED TO TEST FLOOD CONDITIONS.

AS PER TABLE 3, PAGES D-12, D-13 OF THE
'RECOMMENDED GUIDELINES FOR SAFETY INSPECTION
OF DAMS', THE RECOMMENDED TEST FLOOD WILL
BE 50 TO 100 YEAR FREQUENCY FLOOD.

USING CONNECTICUT FLOOD FLOW FORMULA

$$\begin{aligned} Q_{\text{MEAN}} &= 0.85 \times A \times S \\ &= 0.85 \times 41 \times 53 = 1850 \text{ CFS} \end{aligned}$$

$$\begin{aligned} Q_{100} &= 5 \times 1850 \\ &= 9300 \\ &\text{SAY } \underline{9500 \text{ CFS}} \end{aligned}$$

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT Schwartz Pond Dam

DATE 12/17/80

TIME Morning

WEATHER Sunny 20's

W.S. ELEV. _____ U.S. _____ D.V.S. _____

PARTY:

1. Ramesh P. Singhal (RS)
2. Ed Henderson (EH)
3. Wesley J. Wolf (WW)
4. Gerald Buckley (GB)
5. _____

DISCIPLINE:

- Hydraulics
- Geotechnical
- Hydraulics
- Soils & Structures
- _____

PROJECT FEATURE

INSPECTED BY

- | | |
|-----------------------------|-----------------------|
| 1. <u>Dam Embankment</u> | <u>RS, EH, WW, GB</u> |
| 2. <u>Spillway</u> | <u>RS, EH, WW, GB</u> |
| 3. <u>Regulating Outlet</u> | <u>RS, EH, WW, GB</u> |
| 4. _____ | _____ |
| 5. _____ | _____ |
| 6. _____ | _____ |
| 7. _____ | _____ |
| 8. _____ | _____ |
| 9. _____ | _____ |
| 10. _____ | _____ |

PERIODIC INSPECTION CHECK LIST

PROJECT Schwartz Pond Dam

DATE 12/17/80

PROJECT FEATURE Dam Embankment
including Miscellaneous Walls

NAME RS, EH, WW, GB

DISCIPLINE _____

NAME _____

AREA ELEVATED	CONDITIONS
<u>DAM EMBANKMENT</u>	
Crest Elevation	101.3' ± (NGVD)
Current Pool Elevation	96.2' ± (NGVD)
Maximum Impoundment to Date	Unknown
Surface Cracks	None Observed
Pavement Conditions	N/A
Movement or settlement of crest	None Observed
Lateral movement	None Observed
Vertical alignment	Looks Good
Horizontal alignment	Looks Good
Conditions at abutment & at Concrete Structures	Some Concrete Deterioration of Wingwalls
Indications of Movement of Structural Items on Slopes	Stone Wall Tilted - East Side of Dam
Trespassing on Slopes	Pedestrian Only - No Sign of Damage
Sloughing or Erosion of Slopes or Abutments	None Observed
Rock Slope Protection-Riprap Failures	N/A
Unusual Movement or Cracking at or Near Toes	None Observed
Unusual Embankment or Downstream Seepage	Seepage Under Stone Wall at East Side of Dam
Piping or Boils	None Observed
Foundation Drainage Features	N/A
Toe Drains	N/A
Instrumentation System	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT Schwartz Pond Dam DATE 12/17/80
 PROJECT FEATURE Spillway Weir & NAME RS, EH, W/W, G.B
 DISCIPLINE Channels NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	No Specific Channel. Pond at Spillway
General Condition	Good - Island in Center
Loose rock overhanging channel	None
Trees Overhanging Channel	Few on Island & West Wall
Floor of Approach Channel	Silt Bottom - Clean
b. Weir and trailing walls	Spillway is Monolithic Concrete
General Condition of Concrete	Fair
Rust or Staining	None Observed
Spalling	Minor - Erosion Exposing Coarse Aggregate
Any Visible Reinforcing	None
Any Seepage or Efflorescence	None Observed (Would be ob- scured by Water Flow)
Drain Holes	N/A
c. Discharge Channel	Natural Channel
General Condition	Clean
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Few
Floor of Channel	Rocky, but Clean
Other Obstructions	Highway Bridge with Sewer Hung on Under Side

PERIODIC INSPECTION CHECK LIST

PROJECT Schwartz Pond Dam

DATE 12/17/80

PROJECT FEATURE Regulating Outlet

NAME RS, FH, WW, GB

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITIONS
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL General Condition of Concrete Rust or Staining Spalling Erosion or Cavitation Visible Reinforcing Any Seepage or Efflorescence Condition at Joints Drain Holes Channel Loose Rock or Trees Overhanging Channel Condition of Discharge Channel	Features of Regulating Outlet that are Visible are ① Opening in Face of Dam Concrete is Deteriorated ② Front Face of Wooden Sluicgate - Leaking ③ Inoperable Mechanism to Lift Gate Same as Channel for Spillway Note: The Regulating Outlet Discharges Through 3'x4' Opening at East End of Dam. Bottom of Opening is 7' Below Spillway Crest. Wooden Gate is Visible Through Opening.

APPENDIX B

ENGINEERING DATA

ENGINEERING DATA CHECKLIST

<u>ITEM</u>	<u>AVAILABILITY</u>	<u>LOCATION</u>
LOCATION MAP	Available	USGS Map
AS-BUILT DRAWINGS	Not Available	
HYDROLOGIC & HYDRAULIC DATA	Not Available	
SOIL BORINGS	Not Available	
SOIL TESTING	Not Available	
GEOLOGY REPORTS	Not Available	
CONSTRUCTION HISTORY	Not Available	
OPERATION RECORDS	Not Available	
INSPECTION HISTORY	Not Available	
DESIGN REPORT	Not Available	
DESIGN COMPUTATIONS	Not Available	
HYDROLOGIC & HYDRAULIC	Not Available	
DAM STABILITY	Not Available	
SEEPAGE ANALYSIS	Not Available	

32	12/17/80	Sunny	20's	Σ	W3W
SCHWARTZ POND				DAM	ETK
BS	H.I.	F.S	ELEV		NGVD
RM-9	4.85	06.54	101.69		
CHISELED SQUARE ON THE SW CORNER OF					
2ND STEP OF SW WINGWALL OF					
BOSTON NECK ROAD CROSSING OF					
STONEY BROOK (NGVD - NATIONAL GEODETIC					
VERTICAL DATUM - 1929) - FROM FLOOD					
INSURANCE STUDY OF TOWN OF SUFFIELD					
12' N. FROM S END OF EAST RETAINING WALL					
BOTTOM OF POND AT SHOT 1					
N. END OF EAST RETAINING WALL					
BOTTOM OF POND AT SHOT 3					
TOP OF E. WINGWALL AT SPILLWAY					
BOTTOM OF POND AT SHOT 5					
TOP OF SPILLWAY (EAST)					
BOTTOM OF SPILLWAY (ROCK SHEET) (EAST)					
TOP OF END OF EAST WINGWALL					
STREAM BROOK AT SHOT 9					
TOP OF ^{STONE} WALL E. OF E. WINGWALL					
TOP OF END OF STONE WALL NE OF E. WING					
TOP OF SLOPE 25' E. OF SHOT 12					
TOP OF GROUND BELOW SHOT 12					
EDGE OF H ₂ O 35' W. OF SHOT 12					
TOP OF SLOPE 25' E. OF SHOT 11					
CENTER OF ROAD AT A BRIDGE					
STREAMBED S. OF BRIDGE AT E. ABUTMENT					

SHOT - 1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

34

35

B.S.

H.T.

F.S.

ELEV.

106.54

19

20.1

86.4

20

21.2

85.3

21

19.9

86.6

22

7.2

99.3

23

12.98

93.56

24

9.03

97.51

25

6.7

99.8

26

5.24

101.30

27

10.39

96.15

28

21.2

85.3

29

12.6

93.9

30

11.47

95.07

31

20.2

86.3

32

4.8

101.7

33

9.1

97.4

34

3.8

102.7

35

6.9

99.6

36

5.4

101.1

37

16.5

90.0

38

10.2

96.3

39

19.6

86.9

RM-9

4.87V

STREAM BED S. OF BRIDGE AT E. PIER

" " " " " W. "

" " " " " W. ABUTMENT

BOTTOM OF BRIDGE SUPERSTRUCTURE AT

TOP OF 2.17' O.D. C.I. SEWER PIPE E.P.C.

BOTTOM OF STRUCTURE HOLDING

WOODEN WALKWAY, C.I. SEWER, & WATER PIP.

TOP OF WOODEN WALKWAY

TOP OF W. RETAINING WALL &

WINGWALL AT SPILLWAY (WEST)

TOP OF SPILLWAY (WEST)

BOTTOM OF SPILLWAY (WEST)

BOTTOM OF POND AT SHOT 26

TOP OF THE END OF THE W. WINGWALL

BOTTOM OF STREAM AT SHOT 30

TOP OF STONEWALL-1 (N. EDGE)

GROUND BELOW SHOT-32

TOP OF STONEWALL-2 (E)

GROUND BELOW SHOT-34

TOP OF STONEWALL-3 (E)

GROUND SHOT BELOW SHOT 36

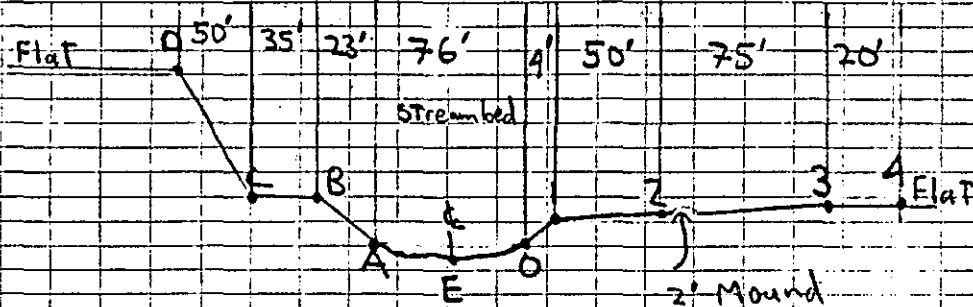
EDGE OF H₂O AT SHOT 26EDGE OF H₂O 17' N. OF END OF W. WINGWALL

See Page 33

36 2/13/81	Cloudy 40°	KLWJW J. ETK
SWARTZ POND DAM		
DOWNSTREAM CROSS SECTIONS		
STONEY BROOK		
B.S	HI FS	ELI
RM-9	102.57	101.61
TP-1	98.70	92.97
TP-2	95.47	92.63
CS1-0	13.1	92.4
CS1-1	8.6	86.9
CS1-2	5.4	90.1
CS1-3	4.9	90.6
CS1-4	5.2	84.7
TP-3	99.27	83.6
CS1-A	15.7	83.6
CS1-B	8.0	91.3
CS1-C	5.5	93.8
TP-4	112.32	93.76
CS1-D	3.4	115.0
TP-5	112.12	112.02
RM-9	16.53	101.59
CS-E	6.9	81.4

SEE PAGE 33

CROSS SECTION - 1 STONEY BROOK (LOOKING DOWNSTREAM)

CROSS SECTION - 1
CS1

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SCHWARTZ POND DAM

Number D-2

3.26.1981

R.S.

SPILLWAY CAPACITIES

THE SPILLWAY CONSISTS OF THE FOLLOWING:

- 1- 3'x4' REGULATING OUTLET WITH ITS
BOTTOM AT ELEVATION 89.0
- 1- OVERFLOW SECTION OF DAM 86 FT. LONG
CREST ELEV. 96.0

SPILLWAY CAPACITIES AT VARIOUS ELEVATIONS ARE
TABULATED BELOW:

ELEVATION	CAPACITY - CFS		
	LOW LEVEL OUTLET 3'x4' SIZE $Q = 2.4 \times 3 \times (H_2 - H_1)^{3/2}$ CFS	OVERFLOW SECTION OF DAM $Q = 3.0 \times L \times H^{3/2}$ CFS	TOTAL - CFS
89.0	0.0	0.0	0.0
91.0	20.0	0.0	20.0
93.0	60.0	0.0	60.0
96.0	100.0	0.0	100.0
98.0	115.0	730.0	845.0
100.0	130.0	2070.0	2200.0
102.0	140.0	3960.0	4100.0
105.0	155.0	13845.0	14000.0

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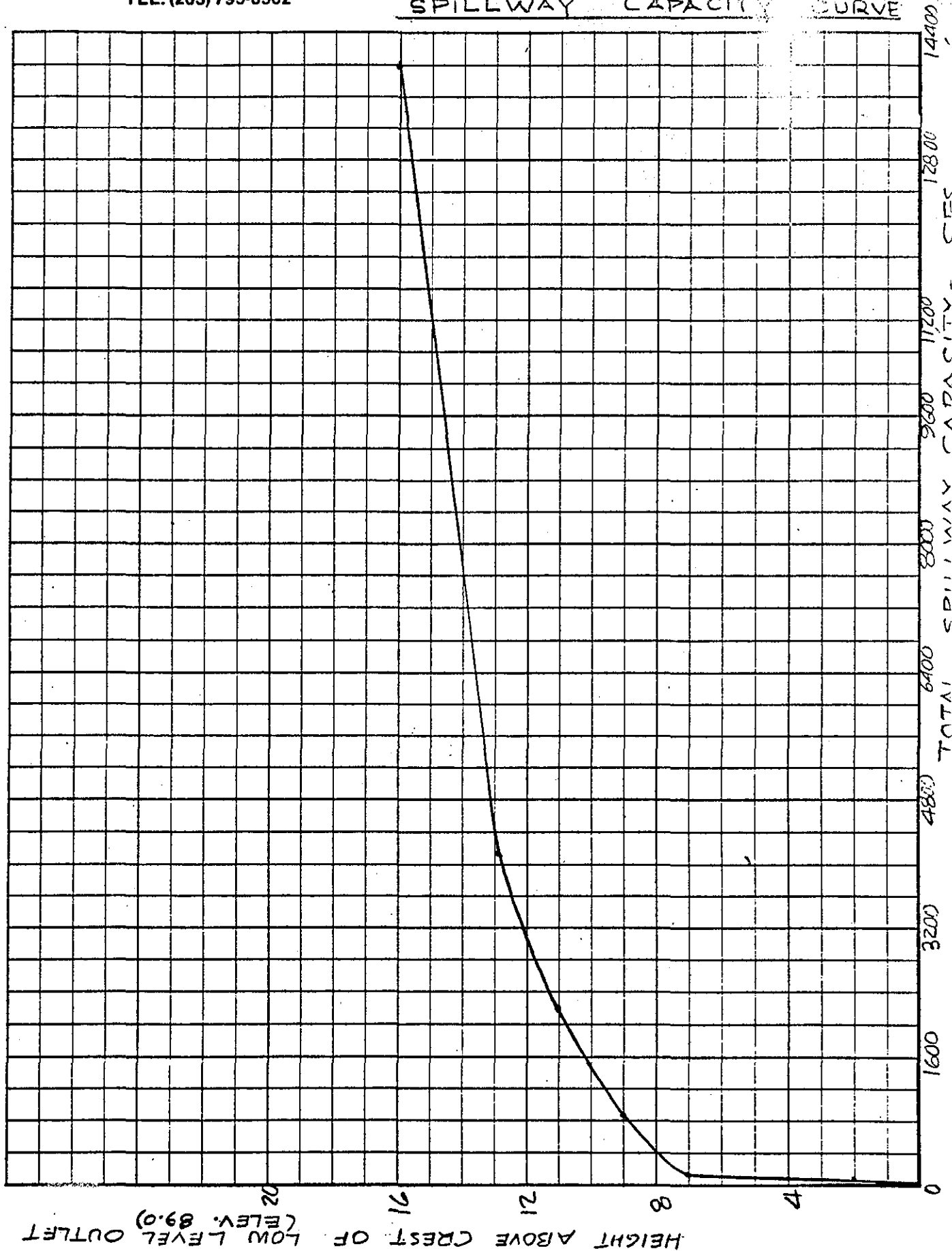
Job SCHWA POND DA

By R.S.

DATE

BY

SPILLWAY CAPACITY CURVE



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Sheet Number D-4

Date 3.27.1981

By R.S.

SURCHARGE STORAGE

WATER SURFACE AREAS

RESERVOIR WATER SURFACE ELEVATION	HEIGHT ABOVE SPILLWAY CREST	WATER SURFACE AREA (ACS.)	SURCHARGE STORAGE CAPACITY (AC-FT.)
96.0	0.0	11.5	0.0
98.0	2.0	14.4	22.0
100.0	4.0	17.2	43.0
102.0	6.0	19.5	93.0
105.0	8.0	23.0	143.0

N.B. STORAGE CAPACITY BELOW SPILLWAY CREST
= 77 AC-FT.

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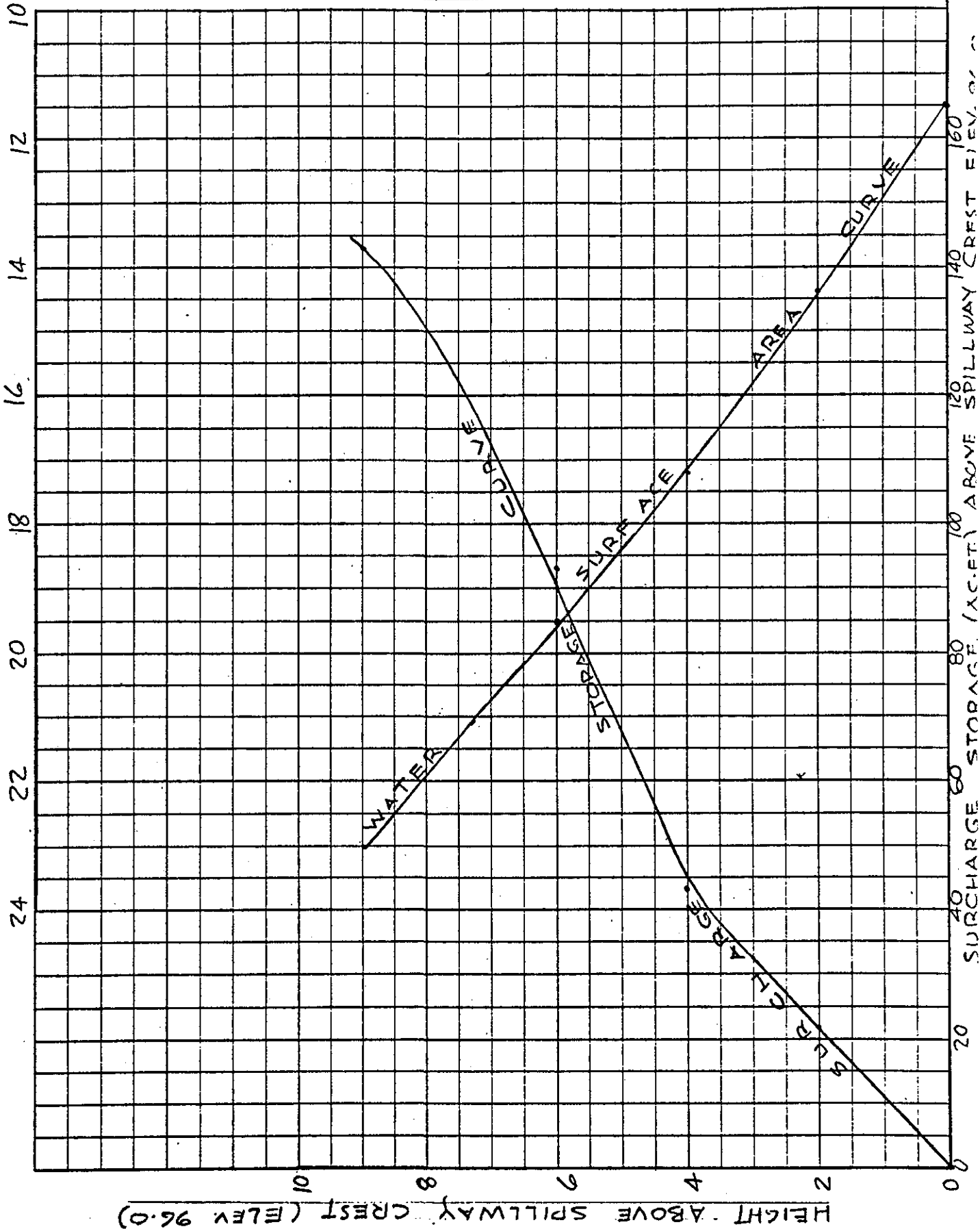
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By R.S.

SURCHARGE STORAGE & WATER SURFACE AREAS

WATER SURFACE AREA - ACS.



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Job SCHWARTZ POND DAM

Sheet Number D-6

Date 3. 27. 1981

By R.S.

INFLOW, ROUTED OUTFLOW & ADEQUACY OF SPILLWAY CAPACITY

TEST FLOOD = 9,500 CFS.

SPILLWAY CAPACITY UPTO TOP OF DAM (ELEV. 101.3) = 3300 CFS

THIS IS INADEQUATE AND THE DAM WILL BE OVERTOPPED.

IN ORDER TO PASS THE TEST FLOOD, THE WATER LEVEL WILL RISE TO ELEVATION 103.6 WHICH IS 2.3 FT. ABOVE THE CREST ELEVATION OF THE DAM (101.3). THIS DOES NOT TAKE INTO CONSIDERATION, THE EFFECT OF SURCHARGE STORAGE.

EFFECT OF SURCHARGE STORAGE ON PEAK OUTFLOW

FOR $Q_{P1} = 9,500$ CFS., HEIGHT ABOVE CREST OF SPILLWAY = 7.6 FT.

AND SURCHARGE STORAGE = 133 AC.FT.

WHICH CORRESPONDS TO A DEPTH

$$= \frac{133 \times 12}{41 \times 640} = 0.06''$$

$$Q_{P2} = Q_{P1} \left(1 - \frac{0.06}{7.0}\right) = 9500 \times 0.991 \\ = 9400 \text{ CFS.}$$

THE AVAILABLE STORAGE IS VERY SMALL AND THE OUTFLOW ALMOST EQUALS THE INFLOW.

THE DAM WILL BE OVERTOPPED BY APPROXIMATELY

$$103.6 - 101.3 = 2.3 \text{ FT.}$$

THE MAXIMUM SPILLWAY CAPACITY UPTO TOP OF THE DAM EQUALS 3300 WHICH IS 35% OF THE ROUTED OUTFLOW RATE.

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Sheet Number D-7

Date 3.27.1981

By R.S.

DAM FAILURE FLOOD FLOW

AS PER CORPS OF ENGINEERS' GUIDELINES:

$$Q_{PI} = \frac{8}{27} \cdot W_b \cdot \sqrt{g} \cdot y_o^{3/2}$$

WHERE

Q_{PI} = DAM FAILURE PEAK OUTFLOW IN CFS

W_b = BREACH WIDTH = 40% OF DAM LENGTH
AT MID-HEIGHT.

Y_o = HEIGHT FROM STREAMBED TO POOL LEVEL AT
FAILURE

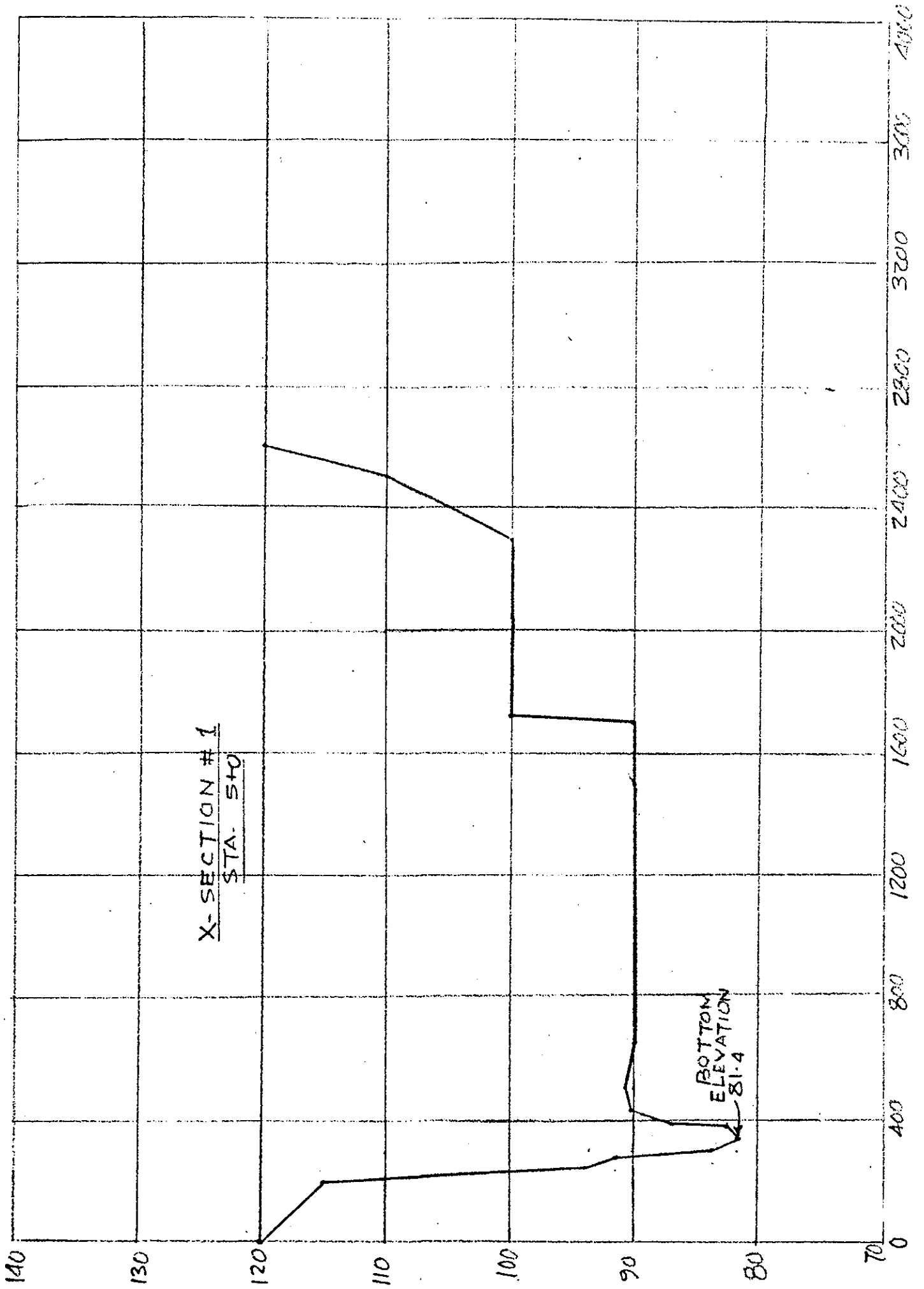
SUBSTITUTING KNOWN VALUES OF W_b AND Y_o AS
 $0.4 \times 128' = 50$ FT., AND 16 FT. RESPECTIVELY - THE
FAILURE ASSUMED WITH POOL AT TOP OF DAM
ELEVATION 101.3 :

$$\begin{aligned} Q_{PI} &= \frac{8}{27} \times 50 \times \sqrt{32.2} \times 16^{3/2} \\ &= 5400 \text{ CFS (APPROX.)} \end{aligned}$$

NOTE: THE ROUTED TEST FLOOD FLOW OF
9,400 CFS BEING LARGER IN VALUE, WILL
BE USED FOR DOWNSTREAM HAZARD
ANALYSIS.

3.30.1981

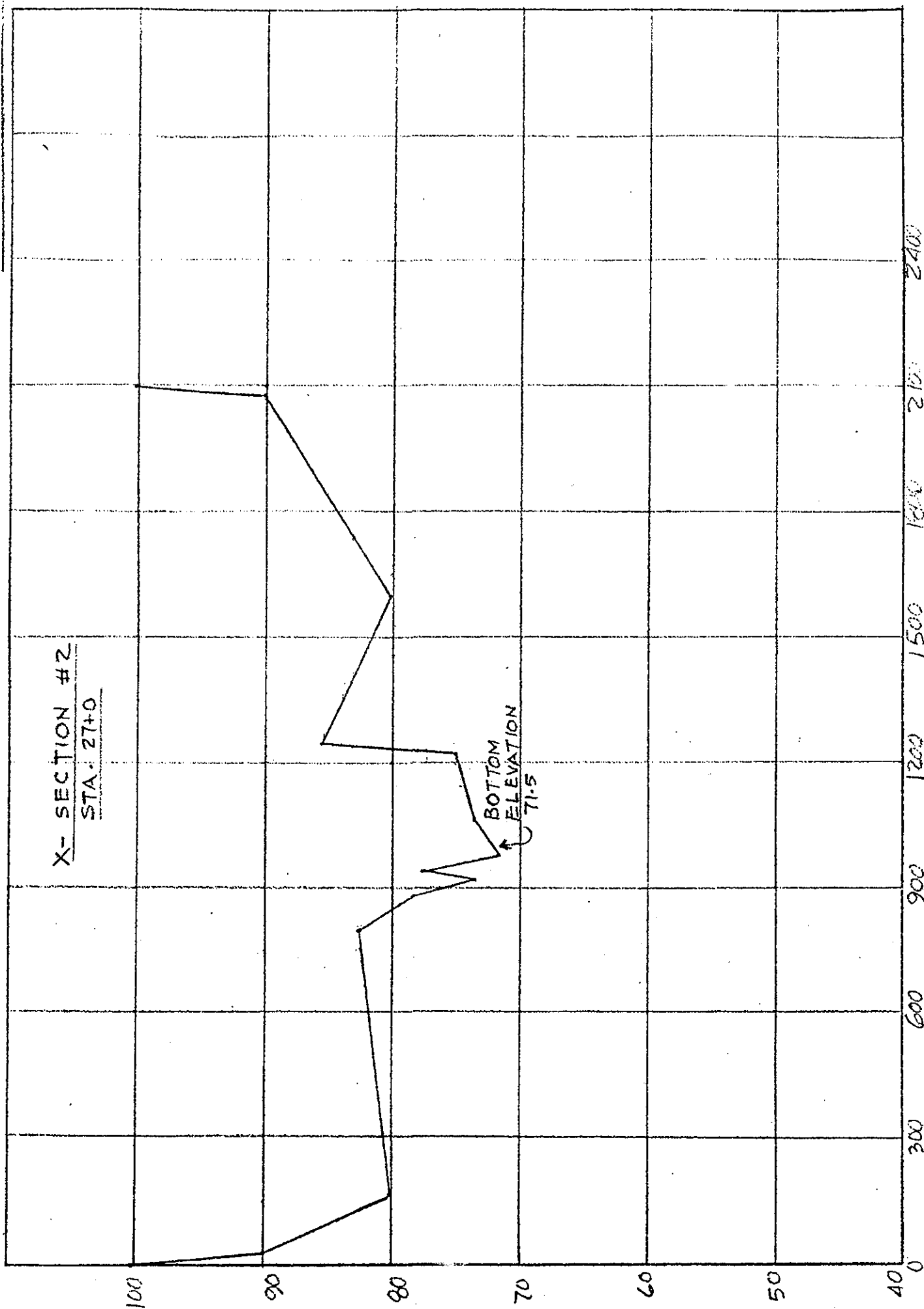
SCHWARTZ POND DAM



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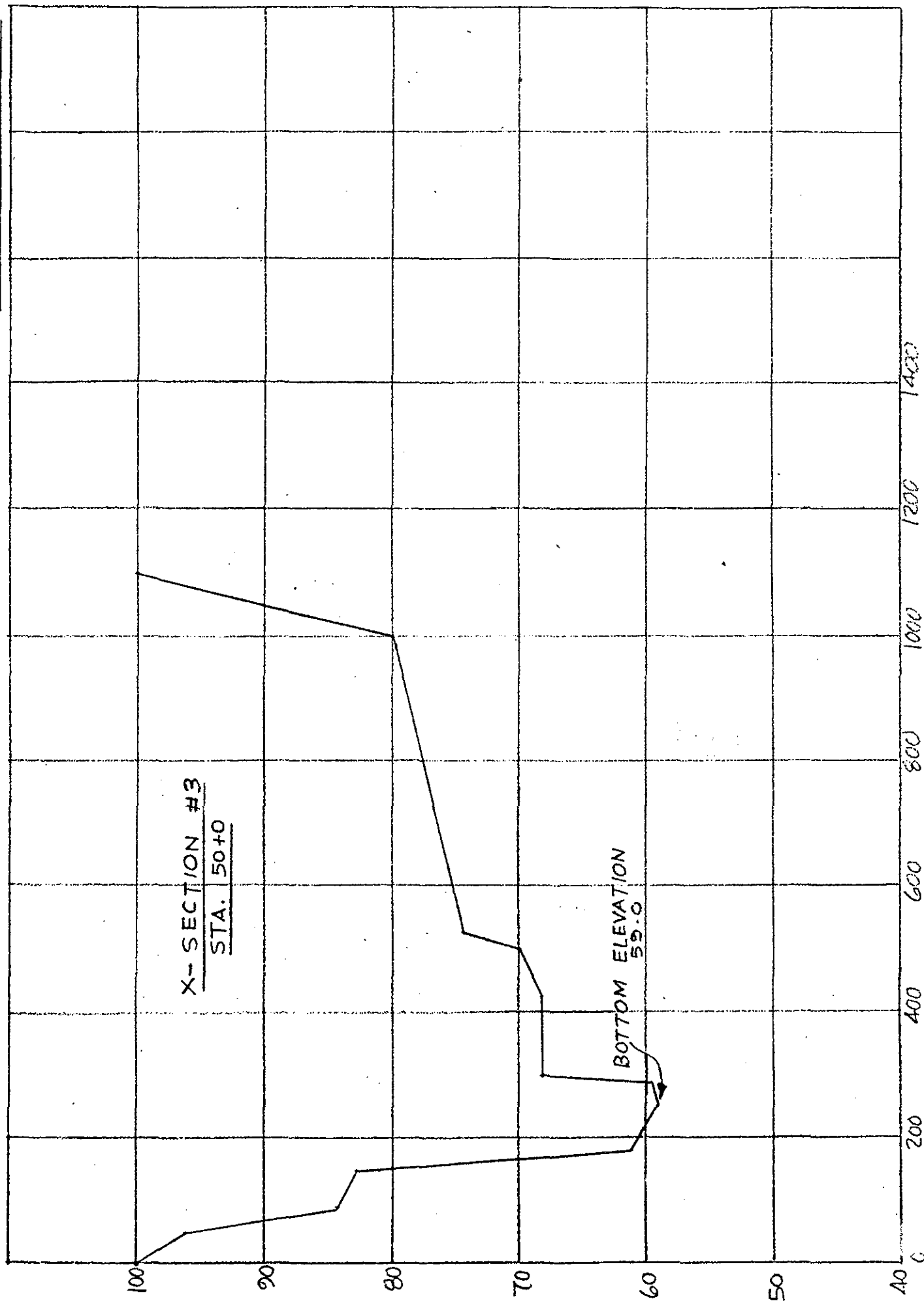
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SCHWARTZ POND DAM



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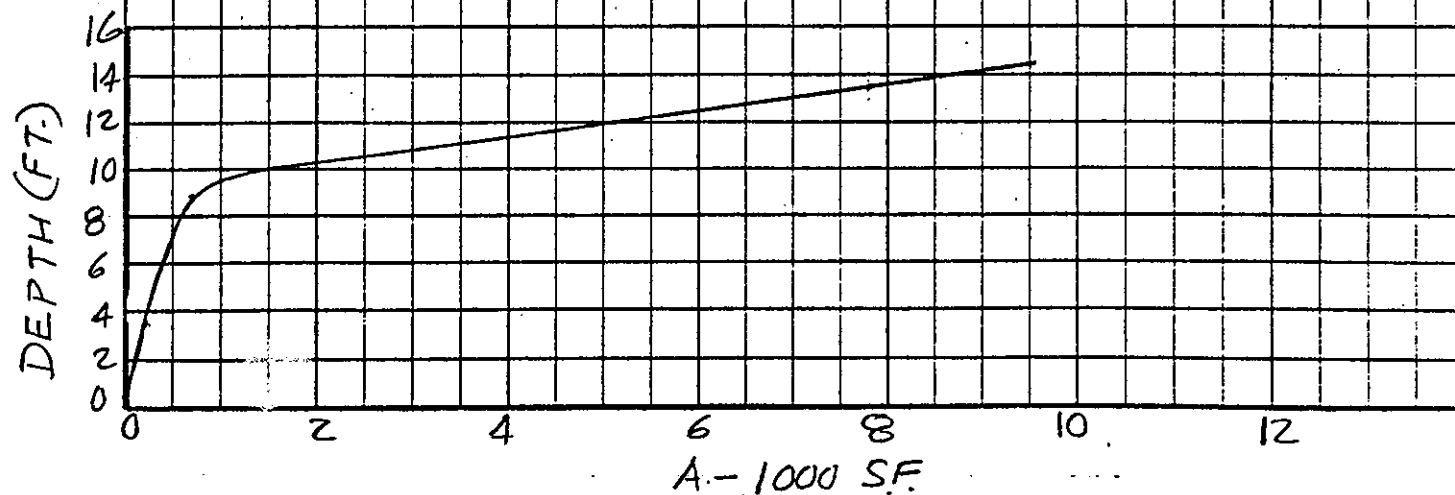
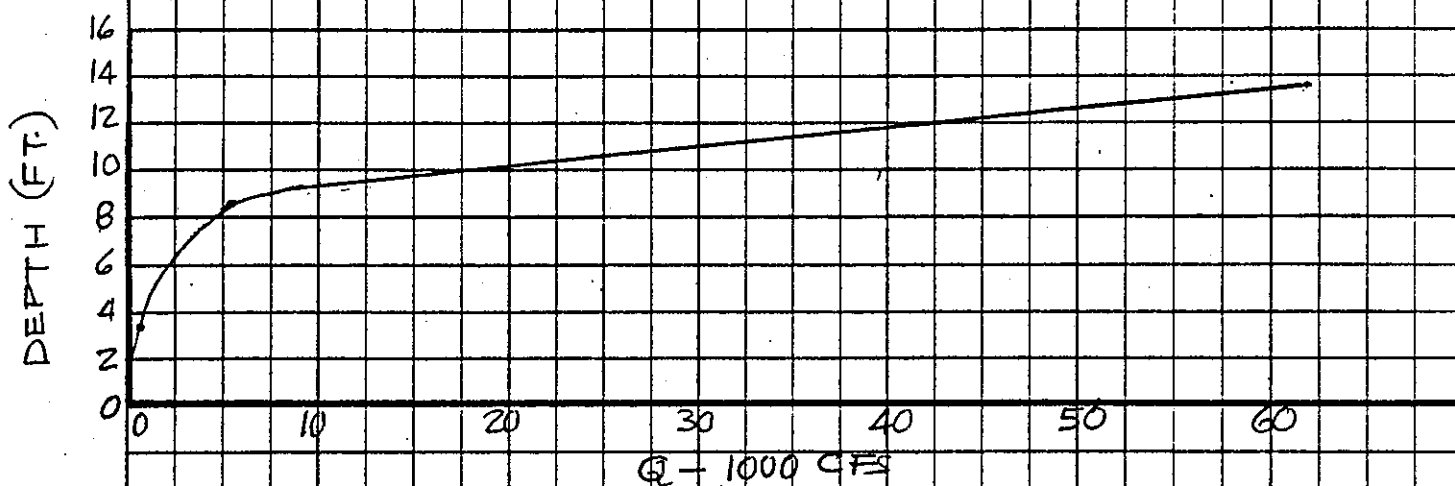
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DOWNSTREAM FLOOD HAZARD

ELEV. (FT)	X-SECTION #1						
	D (FT)	P _w (FT)	A (SF)	R (A/P _w) (FT)	S (FT/FT)	V = $\frac{1.48}{n} R^{2/3} S^{1/2}$ (FT/SEC)	Q (CFS)
85.0	3.6	80	200	2.5	↓	4.70	950
90.0	8.6	150	720	4.8	0.0036	7.26	5200
95.0	13.6	1450	7850	5.4	↓	7.85	62000



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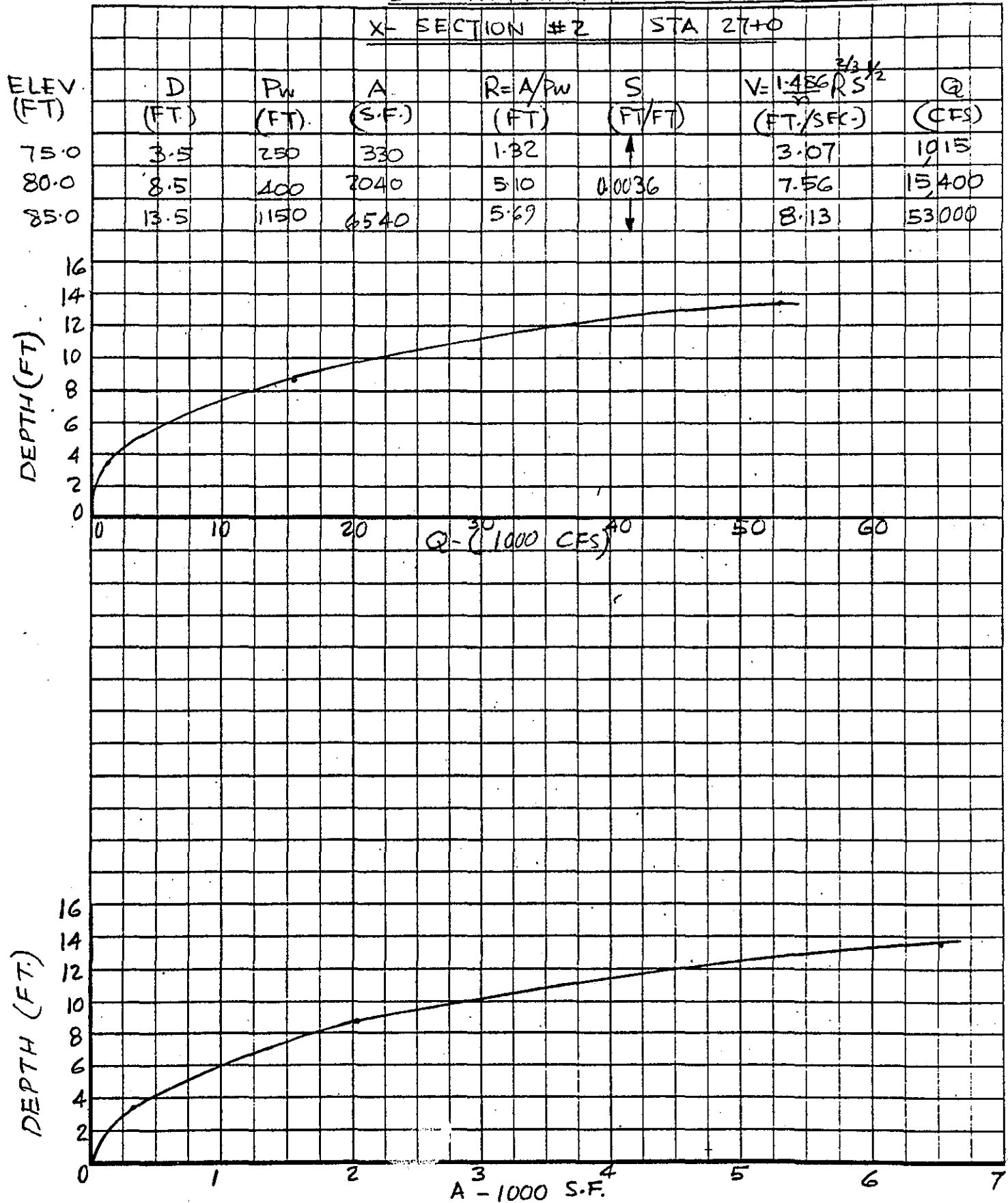
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DOWNSTREAM FLOOD HAZARD



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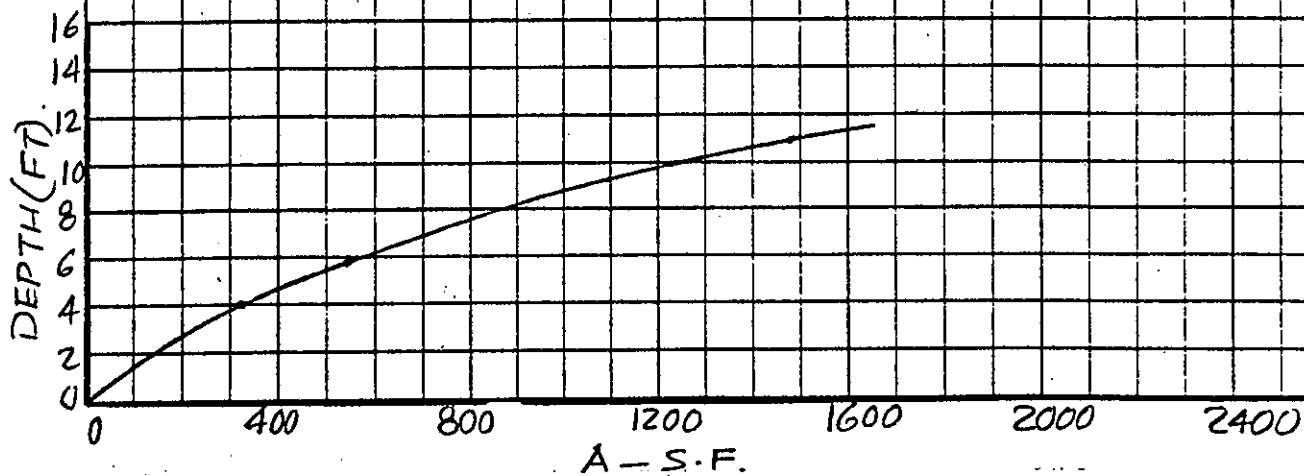
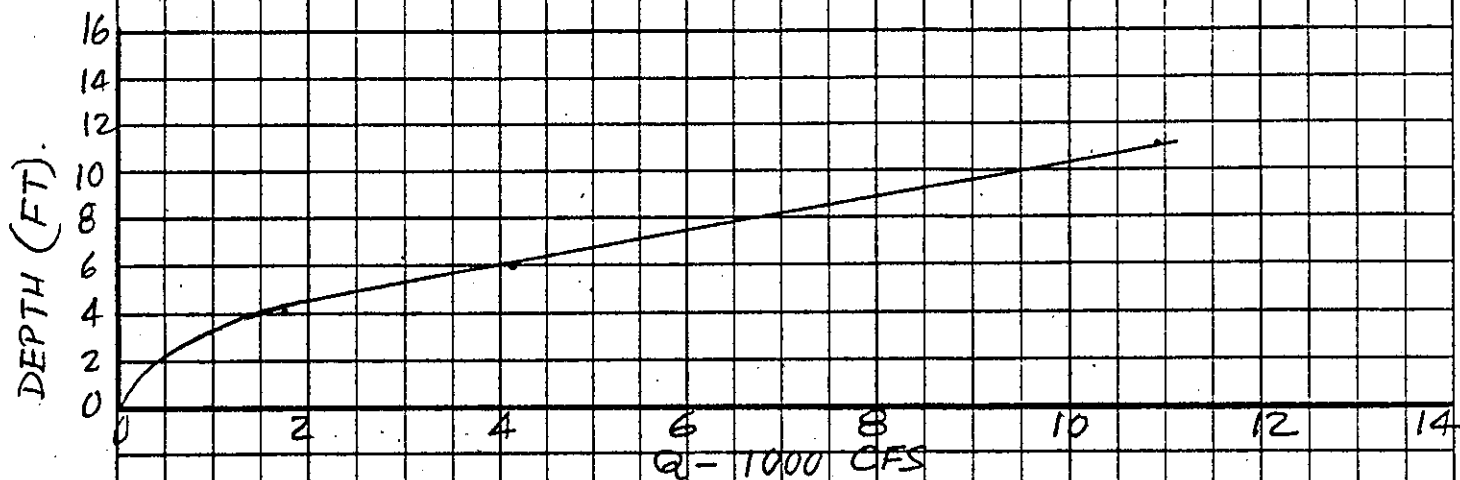
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DOWNSTREAM : FLOOD HAZARD

X-SECTION #3 STA. 50+0

ELEV. (FT.)	D (FT.)	P _w (FT.)	A (S.F.)	R = A/P _w (FT.)	S (FT/FT)	V = $\frac{1.486}{n} R^{2/3} S^{1/2}$ (FT/SEC)	Q (CFS.)
63.0	4.0	110	320	2.91	↓	5.48	1750
65.0	6.0	120	550	4.58	0.004	7.42	4080
70.0	11.0	330	1490	4.52	↓	7.35	10950



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Job SCHWARTZ POND DAM

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By R.S.

DOWNSTREAM FLOOD HAZARD

(UNDER TEST FLOOD 9,400 CFS WHICH EXCEEDS DAM FAILURE FLOW OF 5,400

X-SECTION #1 STA 5+0

FOR $Q_{P1} = 9400$ CFS

$$H_1 = 9.0' \quad \text{AND} \quad A_1 = 1240 \text{ SF.}$$

REACH LENGTH = 500'

$$\text{STORAGE} = 500 \times 1240 / 43560 = 14 \text{ AC. FT.}$$

$$Q_{P2} = Q_{P1} \left(1 - \frac{14}{150}\right) = 9400 \times 0.91 = 8,550 \text{ CFS.}$$

$$H_2 = 8.9' \quad \text{AND} \quad A_2 = 1130 \text{ SF.}$$

$$\text{STORAGE} = 500 \times 1130 / 43560 = 13 \text{ AC. FT.}$$

$$\text{AVG STORAGE} = \frac{1}{2} (13 + 14) = 13.5 \text{ AC. FT.}$$

$$Q_{P3} = Q_{P1} \left(1 - \frac{13.5}{150}\right) = 9400 \times 0.91 = 8,550 \text{ CFS.}$$

THE ROUTED FLOW BELOW X-SECTION #1
WILL BE APPROX. 8,550 CFS.

AND DEPTH OF FLOW = 8.9'

$$\begin{aligned} \text{FLOOD ELEVATION} &= 81.4 + 8.9 \\ &= \underline{90.3} \end{aligned}$$

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Job SCHWARTZ POND DAMSheet Number Date 3.30.1981By R.S.DOWNSTREAM FLOOD HAZARDX- SECTION #2 STA. 27+0FOR $Q_{P1} = 8550$ CFS

$$H_1 = 6.1' \quad \text{AND} \quad A_1 = 1220 \text{ SF.}$$

$$\text{REACH LENGTH} = 2200'$$

$$\begin{aligned} \text{STORAGE} &= 2200 \times 1220 / 43560 \\ &= 62 \text{ AC-FT.} \end{aligned}$$

$$Q_{P2} = Q_{P1} \left(1 - \frac{62}{150}\right) = 8550 \times 0.59 = 5050 \text{ CFS}$$

$$H_2 = 4.9'$$

$$A_2 = 806 \text{ S.F.}$$

$$\text{STORAGE} = 806 \times 2200 / 43560 = 41 \text{ AC-FT.}$$

$$\text{AVG. STORAGE} = \frac{1}{2} (41 + 62) = 52 \text{ AC-FT.}$$

$$Q_{P3} = Q_{P1} \left(1 - \frac{52}{150}\right) = 8550 \times 0.65 = 5600 \text{ CFS}$$

$$H_3 = 5.0'$$

ROUTED FLOW BELOW X- SEC. #2 WILL
BE APPROXIMATELY 5600 CFS

$$\begin{aligned} \text{FLOOD ELEVATION} &= 71.5 + 5.0 \\ &= \underline{76.5} \end{aligned}$$

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Job SCHWARTZ POND DAM

Sheet Number _____

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DOWNSTREAM FLOOD HAZARD
X-SECTION #3 STA. 50+0

FOR $Q_{P1} = 5600$ $H_1 = 7.1$ AND $A_1 = 757$ S.F.

REACH LENGTH = 2300 FT.

STORAGE = $2300 \times 757 / 43560 = 40$ AC-FT. $Q_{P2} = Q_{P1} (1 - \frac{40}{150}) = 5600 \times 0.73 = 4100$ CFS $H_2 = 6.0'$ AND $A_2 = 550$ STORAGE = $550 \times 2300 / 43560 = 29$ AC-FT.AVG. STORAGE = $\frac{1}{2}(29 + 40) = 34.5$ AC-FT. $Q_{P3} = Q_{P1} (1 - \frac{34.5}{150}) = 5600 \times 0.77 = 4300$ CFS..AND $H_3 = 6.2'$

ROUTED FLOW BELOW X-SEC. #3 WILL
BE 4,300 CFS. APPROXIMATELY

FLOOD FLOW ELEVATION

 $= 59.0 + 6.2 = 65.2$ SAY 65.0

NOTE: THERE IS NO FLOODING HAZARD
UNDER TEST FLOOD CONDITIONS EXCEPT
PARTIAL FLOODING OF ONE HOUSE.

THE DAM BREACH FLOOD FLOW
BEING SMALLER THAN TEST FLOOD
WILL NOT PRODUCE ADDITIONAL HAZARD

APPENDIX E

INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

